Institutional Underpinnings is part of the ARDC’s National Data Assets Initiative. In this program, 25 Australian universities are collaboratively developing a national Institutional Research Data Management (RDM) Framework. This Framework is intended to inform institutions’ design of policy, procedures, infrastructure and services, and improve coordination of RDM within and between institutions. This output describes the initial findings of the research data management Support, Training and Guidance element of the Framework, providing institutions with guidance for researchers and research students to gain essential knowledge to manage research data effectively. The challenges associated with educating
researchers in research data management are outlined in order to enable institutions to address these in developing strategies for providing support, training and guidance. Successful approaches are discussed, and information on components that institutions should view as necessary when creating an approach to education are provided. Recommendations for institutions are highlighted throughout the Element. This initial research data management framework Support, Training and Guidance Element will be further developed through additional institutional consultation and will be complemented by activities to validate and test the outputs described within.

DESCRIPTION OF THE ELEMENT COMPONENT

To ensure all researchers and research students have the essential knowledge to manage data effectively it is necessary to provide support, training, and guidance as Research Data Management (RDM) is complex, institutionally specific and multifaceted. Support encompasses the available training and educational resources provided to staff and students about RDM. Training includes a structured event or experience that has clear learning objectives and requires participants to be able to demonstrate the extent of how the objectives were met. Guidance includes online tools or resources to guide practice and behaviour and includes mandatory checklists and policies or procedures. Advice includes avenues for help, one-on-one consultations and/or direct advice from the relevant staff across the institution about RDM – including in response to bespoke arrangements or RDM requirements for collaborative projects.

Support, training, and guidance is a primary vector by which all other elements of the Institutional Underpinnings framework can be delivered to or enabled for researchers. For example: knowledge gained through education, combined with skills acquired through training is a key component of culture change; researchers performing RDM planning will require guidance on how to go through the process and what must be done with the plan; appropriate cybersecurity approaches must be communicated and supported.

Institutions can ensure researchers are equipped with the knowledge and skills to comply with National and institutional RDM requirements by committing to provide foundational education and skills in RDM through the provision of support, training and guidance to their researchers. This enables researchers to conduct compliant research effectively and ethically.

In order to adequately provide support, training and guidance, there are several challenges that institutions need to overcome. In most cases, these challenges are common but they may also vary depending on the size and priorities of each institution. It is important for institutions to address these challenges when planning their strategy for providing support, training and guidance.

Five major common challenges are:
• Financial and human resourcing limitations
• Time-poor researchers generally do not consider RDM training as a priority
• Within institutions it is not always clear who should be approached for training, or support and guidance on RDM
• There are discipline-specific approaches to working with data and in some cases, subject matter experts are not necessarily experts in training
• There are also instances where expertise and systems required for good RDM are distributed between different areas within an institution. Thus a coordinated approach is needed to align different priorities/expectations/requirements within these areas to provide good RDM

DIFFERENCES IN APPROACH AND NEED

It is not feasible to have a one-size-fits-all approach for all institutions. It is likely that a number of different organisational units within each institution will need to collaborate and specialise in the delivery of support, training and guidance for RDM. At a whole-of-institution level, the aims of the approach are to bring together a suite of training, information and resources with the appropriate level of support ranging from general to specialised.

Institutions are at different points of their RDM journey. RDM maturity is likely to predict both the skills and needs of researchers and the availability of existing training materials. For institutions beginning to establish RDM processes, there may be little in the way of existing materials. For these institutions, priorities in providing training advice and guidance will generally include developing an initial range of documentation and training packages. This can be resource-intensive and take time to develop, so the first training provision aims would be to educate researchers in the foundations of RDM.

On the other hand, institutions that are much further along their RDM journey should already have a support, training and guidance package developed. In this case, the main aim in provisioning training might then be to refine/mature the current RDM practices and culture within their institutions, embed RDM into quality research practices and research training and/or provide more advanced data skills training.

Given the different aims and priorities, institutions will consider the minimum required competencies their researchers will need. For some competencies, a conceptual, theoretical, or abstract level of understanding may be sufficient and can be sufficiently addressed by shared or common training and materials. Other competencies may require the local development and delivery of practical, applied or concrete skills and guidance.

The approach adopted by each institution is heavily influenced by the level of resourcing available and the infrastructure underpinning support, training and guidance and its useability. In terms of resourcing,
this will include a range of contributing factors such as availability of sufficient funds, staff and the effort required in developing support, training and guidance for the institution. The availability of funds will affect an institution’s decision on whether it leverages existing infrastructure to provide support, training and guidance for its researchers or if it invests in upgrading its infrastructure. The availability of financial resources also allow an institution to have the option of procuring external vendors for provision of training and/or infrastructure upgrades. Institutions may turn to in-house solutions if finances are limited.

RECOMMENDATIONS AND ADVICE

Properties of Successful Approaches

Different institutions may have different approaches depending on their needs. The following advice will be useful to institutions when providing Support, Training and Guidance around RDM.

**Recommendation 1:** Successful approaches around Support, Training and Guidance will generally exhibit these common features:

- The approach has approval and committed support from senior institution staff, approximately at DVC-level (ref. Culture Change element)
- The institution engages in genuine and broad stakeholder engagement and dialogue involving:
  - Researchers
  - Research support staff
  - Technical support staff
  - External stakeholders
    - Funding bodies
    - Technical partners
- That the approach reuses shared and nationally/internationally standard materials/resources as much as possible but that are adapted for local relevance and applicability to all stakeholders within the institution

Necessary considerations that institutions should evaluate and decide on when providing Support, Training and Guidance include:
- Is the institution seeking to meet minimum compliance requirements or go beyond the minimum requirements and find further benefits of increased Support, Training and Guidance?
- To what degree and in what ways will Support, Training and Guidance be outsourced?
- Within the institution:
Who has the relevant expertise and knowledge relating to the information/content to provide Support, Training and Guidance?

Who has skills in providing training?

Are a) and b) the same people?

Are the providers appropriately supported in providing Support, Training and Guidance? eg. given time and resourcing, supported in their own skills development, aided in scheduling, promoting, and managing participants

Are providers able to maximise the reach of training, or if not how can they be supported? eg. visible senior sponsorship, mandatory training, promotion

**Recommendation 2:** Specific required components that institutions should view as necessary when creating an approach to providing Support, Training and Guidance include:

- Document and formally recognise (by senior staff or internal agreement) a defined and coordinated set of roles and responsibilities for Support, Training and Guidance. This should outline who is responsible for determining what level of resourcing is allocated, what is considered within the scope of the Support, Training and Guidance and how Support, Training and Guidance are delivered.

- The minimum areas of institutions that require their roles/responsibilities to be defined are:
  - The Research Office or equivalent
  - The IT department or equivalent
  - The record-keeping department or equivalent
  
  Depending on local organisational structure, areas that may also be included in this document include:
  - Library or equivalent
  - Research Ethics office or equivalent
  - Research Integrity office or equivalent
  - Graduate Research
  - eResearch Office

- Technical requirements that might be considered necessary:
  - An online internet platform to allow users to access training materials and self-help materials. This might be publicly accessible or restricted to institutional users
  - An online meeting platform (eg. Zoom, Webex, MS Teams) to allow training to occur remotely
  - A method of allocating queries or a Customer Relationship Management (CRM) system to allow Support & Guidance queries to be systematically tracked and allocated

**SETTING EXPECTATIONS**

Institutional contexts for support, training and guidance will vary greatly between institutions, so setting common baseline features is difficult.
However, all institutions should expect that:

- RDM will, in most cases, be a secondary concern for researchers, so review the above recommendations on engagement (see Recommendations 1)
- Resourcing for Support, Training and Guidance will be limited (see Recommendations 2 and 3)
- Support, Training and Guidance may require in-house creation and ongoing maintenance of localised training resources (see Recommendations 3)

### Training Outcomes

When developing training packages, it is recommended that institutions consider the following outcomes as the minimum required competencies researchers will need to gain when undertaking institutional training for RDM. For some of these competencies, a conceptual/theoretical/abstract level of understanding is sufficient and are identified as such – these competencies can often be sufficiently addressed by shared/common materials. Other competencies require the development of practical/applied/concrete skills and are often more suited to localised training approaches.

- Defining what research data is/are including sensitive data
- Knowledge of policy framework including The Code\(^1\), legislation, funder requirements, journal requirements
- Applying relevant institutional policy and procedures
- Knowledge of institutional RDM support and systems
- Planning for active RDM in an institutional context
- Creating and maintaining a DMP through the research lifecycle
- Consideration of security, access, back-up, obsolescence, sensitivity - an understanding of why, how to make data secure, and how these relate to data storage and access.
- Understanding how key RDM practices are aligned with a research project lifecycle/process (i.e. from research proposal to completion of project)
- Knowledge of how long to archive data and how to archive data properly when a project is completed or when leaving the institution
- Knowledge of general data publication benefits
- Awareness of the benefits of [Open Data and Open Research](https://ardc.edu.au/resources/aboutdata/open-data)
- Awareness of copyright and licensing issues

In addition, depending on the priorities of each institution, it is possible to consider developing training packages that allow researchers to develop knowledge of and skills in the following:

- Skills to implement the FAIR data principles\(^2\)

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- Skills to implement the CARE principles
- Knowledge of discipline-specific research data repositories
- Enacting best practices in data documentation and data organisation (version control, file naming conventions and metadata) sharing (including licensing), data publishing, re-use (both reusing data and enabling the reuse of data)
- Knowledge of data storage/publications options relevant to their data type (imaging, models, code, lit reviews, video, creative works)
- Knowledge of setting up effective/relevant backup policies
- Knowledge of file types/documentation and how they affect preservation/reuse
- Knowledge of the systems that allow tracking of data impact/reuse/citation
- Knowledge of licensing options for data
- Knowledge on how to publish data and follow relevant data citation practices

**APPLIED ADVICE**

When getting started, institutions should consider including support, training, and guidance in the consultation and planning process prior to implementing any RDM solutions.

In some successful case studies, institutions found that setting up a single point of contact for researchers was critical as researchers usually have trouble knowing which part of the institution is best-placed to give advice on a particular topic. This can be a source of great frustration in many institutions.

These successful case studies also recommended that institutions should consider using or adapting existing resources rather than developing new resources from scratch. Institutions should also consider training their support staff and actively encourage/support them to join national or international communities of practice. This will build a body of knowledge that can be shared within the institution. This will lead to future-proofing the successful delivery of support, training and guidance by laying good foundations. While staff delivering training will develop competencies over time, institutions will need to consider how to provide upskilling opportunities for future trainers, eg. train the trainer approaches. Training trainers will have a positive effect on the effectiveness of the delivery. Institutions should also consider the viability of setting up communities of practice.

Institutions are also recommended to consult relevant Ethics bodies when developing support, training and guidance. All RDM training should be aligned with relevant ethics requirements as many projects will require ethics approvals.

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3 [https://www.gida-global.org/care](https://www.gida-global.org/care)
Finally, Higher-Degree Research (HDR) students need to be taken into account. They may require more specialised training packages. Consider if their training can be linked with their HDR milestones.

**Recommendation 3:** Institutions should consider training approaches that leverage existing staff resources to build an institutional body of knowledge

**Recommendation 4:** Institutions should consult relevant Ethics bodies when developing training materials

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APPENDIX 1: RESOURCE LIBRARY

- 23 Data Things Program https://au-research.github.io/ARDC-23-things/
- Library Carpentry https://librarycarpentry.org/
- Delineating the successful features of RDM training: a systematic review: https://doi.org/10.1080/1360144X.2021.1898399
- Mantra RDM training https://mantra.ed.ac.uk/ and adapt it to provide local context
- https://book.fosteropenscience.eu/
- Digital preservation illustrations: https://www.digitalbevaring.dk/
- How to name files by Jenny Bryan for Reproducible Science Workshop: https://speakerdeck.com/jennybc/how-to-name-files
- TIER Protocol: https://www.projecttier.org/tier-protocol/
- Dryad Good Data Practices for creating reusable data: https://datadryad.org/stash/best_practices