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IMPLEMENTING RESEARCH DATA MANAGEMENT POLICIES ACROSS EUROPE

EXPERIENCES FROM SCIENCE EUROPE MEMBER ORGANISATIONS

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'Implementing Research Data Management Policies Across Europe – Experiences From Science Europe Member Organisations'

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THREE STEPS
TO SUCCESSFULLY IMPLEMENT RESEARCH DATA MANAGEMENT POLICIES

DURING THE DEVELOPMENT PHASE

Take a **collaborative approach** and involve colleagues, both within the organisation and other research stakeholders. This will enhance buy-in and commitment from all actors involved. It also allows to identify potential challenges during the implementation of the policies and explore possible solutions from the very beginning.

DURING THE COMMUNICATION PHASE

Clearly communicate the **usefulness and relevance** of a new policy and explain the underlying concepts. Seek to provide researchers and their home institutions with enough information. While websites and documentation provided throughout the grant application process are widely used, experience shows that most organisations seek more **direct engagement** with researchers and their institutions through workshops, webinars or other events.

DURING THE IMPLEMENTATION PHASE

Provide researchers with the **support and information** they need to develop their data management plans (DMPs). This is essential if they are to be convinced that DMPs are a useful tool. Research organisations have different ways of providing this support. Some have provided online tools to set up and manage DMPs, others have appointed data stewards in the researchers' home institutions.

INTRODUCTION

On 29 January 2019, Science Europe released its 'Practical Guide to the International Alignment of Research Data Management'[1] (hereafter referred to as 'RDM Guide'). As a follow-up, Science Europe compiled the present document to showcase some best practices of the Guide's implementation during the first year after publication. For the sake of readability, research funding organisations (RFOs) and research performing organisations (RPOs) will be jointly referred to as research organisations in this publication.

This document is based on the experiences from organisations that have already implemented the RDM Guide into their policies. It features their approaches in developing research data management (RDM) policies and the means of communication they use to inform researchers and their institutions on the concept of RDM and the requirements of these policies. It also explores which challenges researchers, their home institutions and the funding organisations face, both during and after implementation of the new policies, and provides examples on how researchers can be supported in their RDM efforts.

An increasing number of research organisations request researchers to develop data management plans (DMPs) and select repositories for long-term storage and sharing of their data.

DMPs are meant to encourage researchers to take data management and data sharing into account from the very beginning of the research process. But as long as DMP requirements keep significant variations between different research organisations, participating organisations reported that many researchers still think of DMPs as a bureaucratic burden, rather than a useful tool.

After having worked on discipline-specific aspects[2] of research data management, Science Europe published the RDM Guide as the result of an initiative aimed at aligning RDM across Europe. The objective is to help research organisations to develop RDM policies in a harmonised way. The Guide provides researchers a uniform set of core requirements for their individual DMPs (see annex 1), along with a set of minimum criteria (see annex 2) that a trustworthy research data repository should fulfil. The Guide has made an impact at EU level as the European Commission references it in its Annotated Model Grant Agreement[3] since June 2019.

Since researchers should eventually no longer have to deal with different requirements when working with different organisations, it is quite clear to see how aligned DMP requirements will ultimately support researchers in their data management and data sharing.

During the first year that followed the publication of the RDM Guide, at least seven Science Europe Member Organisations (see below) have already used it to develop or adapt DMP requirements in their institutions. These organisations were surveyed and contributed with their experiences to the present document. Some of them even endeavoured a broader implementation with partners at national level. In addition, Science Europe received information that some universities are using the Science Europe RDM Guide to provide support to their researchers.

The French National Research Agency (ANR), the Irish Health Research Board (HRB), the Polish National Science Centre (NCN) and the Swedish Research Council (VR) have developed their DMP requirements based on the RDM Guide. The Austrian Science Fund (FWF) and the Dutch Research Council (NWO) have updated their existing requirements to align them with the RDM Guide's. The Academy of Finland (AKA) ensured that the already existing national policy on DMPs was updated to integrate the requirements of the RDM Guide. Both ANR (through the French Committee for Open Science) and VR also undertook collaborations with other research organisations to achieve a broader take-up of common RDM policies at national level.

The Swiss National Science Foundation (SNSF) published its policy on Open Research Data (ORD) already in 2017. SNSF (CH) contributed with its expertise to the development of the Science Europe RDM Guide. The present publication therefore also provides examples of the SNSF policy.

DEVELOPMENT
OF RESEARCH DATA POLICIES

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DRIVERS TO DEVELOP RDM POLICIES AND TO REQUEST DMPS

An increasing number of research organisations develop RDM policies and request DMPs. With these policies, these organisations take an important step to adapt to the ever-growing movement towards Open Science, facilitating data sharing and allowing research results to be re-used, verified or reproduced.

For some organisations, the motive to request DMPs is mainly external. The reason for that could be that external funding sources or partners in international collaborations actually require DMPs.

The European Commission, for instance, requests DMPs for projects funded under the current research and innovation framework Horizon 2020 and the future Framework Programme for Research and Innovation Horizon Europe (2021-2017). Since June 2019, Science Europe's RDM Guide is referenced in the Commission's Annotated Model Grant Agreement,[4] thus aligning the Commission's requirements with those of national organisations that implemented the RDM Guide.

In the case where a scientific institution does not have organisational DMP requirements, researchers are often requested to align to the different policies of partners when working on international projects. To ease the work of the researchers, a written organisational policy would be useful and the implementation of the RDM Guide can be considered to harmonise the approach for researchers.

COLLABORATION IS KEY

Experience strongly shows that collaboration and gathering feedback from different actors, inside and outside the organisation, are key to successfully develop a research data policy that is broadly accepted and supported. In all surveyed organisations, the DMP requirements were developed in a collaborative approach, involving different departments of the organisation or various stakeholders on national level (see table A). In all cases,[5] the RDM Guide served as a starting point for the development of the RDM policies. The different policies developed are very much aligned with the RDM Guide.

DEVELOPING DMP REQUIREMENTS WITHIN RESEARCH ORGANISATIONS

In most organisations, the development of the DMP requirements was led by the department in charge of setting rules for the handling of research data. The responsible department consulted other departments and bodies within the organisation. ANR (FR), for instance, included all departments (scientific, legal, communication and financial) in its consultations. At FWF (AT) members of the Executive Board and at NCN (PL) the Scientific Council provided feedback on, and approved the policy.

NATIONAL COLLABORATION STRUCTURES

While some organisations focused on the development of research data policies internally, others involved other organisations at national level. The national approach was ensured either through existing networks or by establishing new structures. Examples of existing networks are the DMPTuuli network group in Finland which consists of representatives from universities and research institutes, or the UKB Research Data Working Group in the Netherlands, which is the consortium of university libraries and the National Library of The Netherlands. New structures are, for instance, the RDM working group set up by VR (SE) or the exchange network among French funding agencies led by ANR.

Such collaboration structures bring together the most relevant actors at national level, including RFOs, RPOs, infrastructures and services linked to data storage and accessibility.

TABLE A: ACTORS INVOLVED IN DEVELOPMENT OF RDM POLICY BASED ON RDM GUIDE

		INTERNAL PROCESS			EXTERNAL PROCESS		
Country	**Organisation**	**Lead**	**Contributors**	**Approval**	**Dedicated collaboration structure to work on DMP requirements**	**Continuous dialogue with contact points in RPOs**	**Feedback from other stakeholders**
AT	Austrian Science Fund (FWF)	Specific department (Strategy, Policy, Evaluation, Analysis)	✓ Other departments, governing bodies	✓ Executive Board	✗	✓	✓ WG DMP of the Project e-infrastructure Austria[6]
FR	French National Research Agency (ANR)	Specific Department (Digital Sciences & Mathematics Department)	✓ Other departments	✓ Executive Board	✓ Funders exchange network; French Institute for Scientific and Technical Information (INIST)[7]	✗	✓ The French Committee for Open Science[8]
FI	Academy of Finland (AKA)	N/A	N/A	N/A	✓ DMPTuuli[9] Network Group	✓ Members of DMPTuuli Network Group	✗
IE	Irish Health Research Board (HRB)	Specific department (Post-Award and Evaluation)	✓ Programme managers (funding)	✓ Directors	✗	✓ Data stewards in RPOs	✓ Data stewards in RPOs
NL	Dutch Research Council (NWO)	Specific department (Executive Board Office Open Science)	✓ Other departments	✓ Executive Board	✓ UKB Research Data WG[10]	✓ Data stewards in RPOs	✓ DANS (Data Archiving and Networked Services)[11]
PL	Polish National Science Centre (NCN)	Specific department (Audit and Compliance Team)	✓ Other departments and Scientific Council representatives	✓ Scientific Council	✗	✗	✗
SE	Swedish Research Council (VR)	Specific department (Research infrastructures)	✓ Other departments and Scientific Councils' representatives	✗	✓ Working group on RDM	✓ Through working group on RDM	✓ Through working group on RDM
CH	Swiss National Science Foundation* (SNSF)	Joint development	✓ Extended management board	✓ Executive Board	✗	✓ Grant offices of the different Swiss research institutions	✓ Grant offices of the different Swiss research institutions and researchers

* Development of policy was not based on the RDM Guide, yet the process was similar to the other organisations

REQUIRING DMPs

All but two organisations focused on the development and implementation of DMP requirements. Their decisions not to integrate the criteria for the selection of trustworthy repositories at first were based on different reasons, some of which are listed below.

Some organisations are still in the process of developing research data policies and focus on aspects they consider most important. In such cases, the DMP requirements are seen as a more urgent matter than developing criteria for trustworthy data repositories. In Finland, for example, research data policies, including provisions on DMPs, have been established at national level for several years, while a discussion on criteria for the selection of trustworthy repositories has not yet taken place.

Institutional repositories sometimes do not comply with the criteria for trustworthy repositories as detailed in the RDM Guide but are continually working to improve their standards. These repositories can act as a last resort for researchers needing a repository to store data if no community repositories are available. Introducing criteria for trustworthy repositories in organisational policies, as detailed in the RDM Guide, bears the risk of excluding such repositories as possible choices for researchers to store their data. HRB (IE) decided therefore not to integrate the criteria for the selection of trustworthy repositories in its policies for the time being.

FWF (AT) has integrated both parts of the RDM Guide in its policies. It foresees a mandatory DMP based on the requirements detailed in the RDM Guide, while the criteria for the selection of trustworthy repository are mentioned as a recommendation in their policy.[12] NWO (NL) recommends the criteria for the selection of trustworthy repositories as part of the DMP template guidance, but does not enforce them.

THE RDM GUIDE AS BASIS: SUCCESSFUL ALIGNMENT

For all DMP requirements, the RDM Guide served as an example and was taken over with only slight modifications. Some organisations already had requirements in place and adapted these to align them with the ones in the RDM Guide. When adapting their requirements, the organisations made sure that all of them were taken into account, but without entirely changing the structure or order of their previous templates. Others, such as VR (SE), added some extra information compared to the requirements stated in the RDM Guide. In the case of NCN (PL) and AKA (FI), the ethical aspect is not included in the DMP requirements since they have specific forms dedicated to ethical issues.

SNSF (CH) established a set of requirements before the RDM Guide was published; these are very similar to the RDM Guide's requirements. The only major difference is that the SNSF template does not request information on data management responsibilities and resources. This might change with a future revision of the DMP requirements, though there are no concrete revision plans for the time being.

COMMUNICATION

PROVIDING THE NECESSARY INFORMATION ON POLICIES AND UNDERLYING CONCEPTS

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COMMUNICATION OF NEW POLICIES

Across all organisations, communication on the RDM policies is manifold (see table B). All organisations' websites provide extensive information about the concept of data sharing in general. They also give detailed information on DMP requirements and how to comply with them. The RDM Guide as the basis of the RDM requirements is often referred to on the respective websites as an additional source of information. In some countries, the DMP templates are not only provided in English (the original language of the RDM Guide), but have also been translated into the national language.

The majority of organisations also provide information for researchers during grant application processes by including details, either in the call information, in the grant approval letter or in the terms and conditions for funding.

Most organisations go further and seek a more direct engagement with both the researchers and their institutions. This can be achieved through workshops, webinars or any other type of events organised for researchers in their respective institutions. This is essential to ensure that researchers and their institutions receive sufficiently detailed information on the RDM requirements. For example, HRB (IE) and VR (SE) engage with research institutions to ensure that the staff dedicated to help researchers with their RDM is well trained.

TABLE B: MEANS AND TARGETS OF COMMUNICATION

INFORMATION ON WEBSITE

Country	Organisation	Underlying concepts of data management explained	Detailed information on DMP requirements	Link to RDM Guide	Translation of RDM Guide or DMP template in national language(s)	Information for researchers with call information, terms and conditions or grant approval	Information events at home institutions for researchers	Information / training for support staff in institutions
AT	Austrian Science Fund (FWF) FWF website	✓	✓	✓	✓	✓	✓	✓
FR	French National Research Agency (ANR) ANR website	✓	✓	✓	✓	✓	✓	✓
FI	Academy of Finland (AKA) AKA website	✓	✓	*	✗	✗	✓	–
IE	Irish Health Research Board (HRB) HRB website	✓	✓	✓	N/A	✓	✓	✓
NL	Dutch Research Council (NWO) NWO website	✓	✓	✓	✗	✓	✓	✗
PL	Polish National Science Centre (NCN) NCN website	✓	✓	✓	✓	✓	✓ (planned)	✓
SE	Swedish Research Council (VR) VR website	✓	✓	✓	✓	✓	✓	✗
CH	Swiss National Science Foundation (SNSF) SNSF website	✓	✓	✓	✗	✓	✓	✓

* indirectly – general AKA website provides link to all Science Europe publications

RAISING AWARENESS AND UNDERSTANDING: NEED FOR TRAINING AND SUPPORT

Researchers are still often reluctant to dedicate time to the setting-up of a DMP rather than to their actual research project. A clearer communication on the opportunities, usefulness and relevance of good RDM and the underlying concepts of Open Science, in general, and DMPs, in particular, is therefore needed. The development of DMPs should be seen as just another step in the process of conducting research.

Researchers' knowledge about RDM is especially limited in countries and organisations where Open Science policies are a rather new aspect of the research process. This leads to misunderstandings about the need to store and archive data long-term. It is important to raise awareness of good practices in this area and to offer clear explanations on what kind of data requires data management. Many scientists express the need for more detailed information and training on RDM issues and for more support in the preparation of DMPs towards their home institutions or funding organisations. This is especially the case as far as understanding the legal aspects of RDM is concerned.

Researchers should therefore liaise with staff of research institutions that have the necessary knowledge to serve as data stewards or professional support for researchers. Organising dedicated training for administrative employees ahead of the implementation of the RDM policy can help in providing a good understanding of the policy, its requirements and benefits.

Funding organisations can also help in giving researchers more detailed information. SNSF (CH) responded to many invitations and took part in workshops at different Swiss research institutions where they introduced and discussed the SNSF open data requirements. These workshops raised a lot of interest among researchers. SNSF has also issued detailed guidelines[13] for researchers. These guidelines explain the FAIR data principles, provide links to examples of DMPs and examples of repositories, both compliant with the FAIR principles and non-commercial. The SNSF guidelines also propose a checklist to identify such repositories.

IMPLEMENTATION
OF AN RDM POLICY BASED ON THE RDM GUIDE

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DIFFERENCES IN THE DETAILS: TIMING OF DMPS

While the approach to develop DMP requirements is quite aligned among the different organisations, there are of course differences in the implementation, as for example the timing of when a DMP needs to be submitted (upon grant proposal submission, after a fixed date after the launch of the research project, upon completion of the project, see table C).

However, there seems to be a common understanding among most organisations that a DMP is a dynamic document that needs updating throughout the research process. The following table provides an overview on the different solutions chosen by the various organisations.

TABLE C: WHEN ARE DMPS REQUESTED?

Country	Organisation	FIRST DMP REQUESTED: With grant application	After grant approval	After start of project	DMP updates	Final DMP at end of project
AT	Austrian Science Fund (FWF)	N/A	✓	N/A	✓	✓
FR	French National Research Agency (ANR)	N/A	N/A	✓ within 6 months of project launch	✓ for projects longer than 30 months an update is requested halfway through the project	✓
FI	Academy of Finland (AKA)	✓	N/A	N/A	✓	✗
IE	Irish Health Research Board (HRB)	N/A	N/A	✓ within 6 months of the grant starting	✗	✓
NL	Dutch Research Council (NWO)	N/A	✓ within 4 months of grant approval	N/A	✗	✗
PL	Polish National Science Centre (NCN)	✓	N/A	N/A	✗	✓
SE	Swedish Research Council (VR)	N/A	✓ before research project starts	N/A	✓	✗
CH	Swiss National Science Foundation (SNSF)	✓	N/A	N/A	✓	✓

FURTHER STEPS TO FULLY IMPLEMENT THE POLICIES

Keeping track of DMP submissions, requesting missing DMPs and monitoring compliance are some of the challenges that research organisations face when implementing DMP requirements. When the home institutions provide support staff, such as data stewards, it is important to ensure that the researchers liaise with them in order to get the necessary information to develop their DMPs appropriately. Some organisations have even already found practical ways to address these very challenges.

NWO (NL) requests as of January 2020 that researchers complete their DMPs in consultation with a data steward or other research data management support staff at their home institutions. Researchers need to indicate the name of the staff member they consulted and the date of the consultation in their DMPs.

In the case of FWF (AT) and SNSF (CH) for example, researchers only receive funding after they submit their duly developed DMPs. In case of missing or unclear information, the funding organisation contacts the researchers, asks for modifications and attempts to clarify any remaining issues directly with the researcher. Only when the DMP meets the requirements, will funding for the project start. This allows the funding organisations to ensure the DMPs are duly submitted.

Monitoring compliance with DMP requirements can also provide useful insights into researchers' needs for further information. SNSF (CH) performed an analysis of submitted DMPs over several funding calls. This analysis provided insights about the most common challenges that researchers encounter when filling out the DMP. The main reasons for asking a revision of the DMP are: no clear statements being made about data sharing, researchers planning to share their data in a way that does not comply with the organisation's policy (typically on own website, as supplementary material of publication, on request, and so on) or researchers mentioning an embargo without giving sufficient justification for it.

Developing ways to evaluate the submitted DMPs is another important step to fully implementing policies that request DMPs in a way that is useful for researchers, their home institutions and their funding organisations. NWO (NL) is currently developing a DMP evaluation grid to help NWO staff who perform the evaluations.

Several Science Europe Member Organisations are also currently exploring ways of evaluating DMPs, taking into account the guidance provided by the RDM Guide. A common approach based on the RDM Guide would allow alignment, not only of the DMP requirements towards researchers, but also of the research organisations' approach to evaluate the DMPs.

ONLINE TOOLS TO SUPPORT RESEARCHERS

To ease compliance with RDM policies in general and DMP requirements in particular, online tools that help researchers with their RDM are a useful means of support. Providing researchers with an online tool to create and manage their DMPs allows for grantees to be equipped with an instrument that makes the adoption of new DMP requirements easier.

ANR (FR) collaborated with the DMP OPIDoR,[14] an online tool that helps create DMPs. The DMP Odipor now provides researchers with the ANR DMP template. The Finnish online tool DMPTuuli[15] also provides DMP services to researchers and contains the AKA DMP template along with other public DMP templates. In order to meet researchers' expressed needs, VR (SE) is looking into possibilities to provide a DMP tool as well. NWO (NL) does not provide its own tool, but strongly encourages its researchers to use the DMPonline[16] tool provided by the Digital Curation Centre (DCC). The NWO DMP template is also available on DMPonline.

Another interesting example is the Spanish National Research Council (CSIC) which also strives to support its researchers who encounter RDM-related problems. CSIC does this through different services available in the institutional repository DIGITAL.CSIC.[17] These services include documentation, training and support on how to set up DMPs. It also provides support for different stages along the data life cycle, including publication of datasets with a proper metadata document.

HRB (IE) is currently in discussion with the DCC to set a bespoke DMP platform that meets the needs of all actors involved. It is expected that such a platform will act as a one stop shop for the management of DMPs through the lifetime of the research project and will integrate the needs of the researcher, the research institution and the funding organisation.

TAKING INTO ACCOUNT DISCIPLINE-SPECIFIC OR INSTITUTIONAL PARTICULARITIES

Most research organisations cater for a wide range of domains. When developing their policies, research organisations need to consider that RDM requirements may differ among disciplines. The RDM Guide was developed to offer a common approach, providing the core requirements every DMP should address, regardless of the research field. DMP templates based on the RDM Guide will therefore be generic enough to allow researchers from all kinds of disciplines to comply with the requirements. Research organisations will need to ensure that all core requirements are met and allow for discipline-specific flexibility if more information is needed, for example by adding more questions that are relevant for any particular discipline.[18]

NWO (NL) allows researchers to use organisational DMP templates from their home institutions as long as those templates are approved by NWO. Approval of institutional templates depends on them matching the requirements of the RDM Guide. A similar approach could work for discipline-specific DMP templates.

Some organisations report that the readiness to develop and submit DMPs can differ according to discipline. More discipline-specific support regarding the development of DMPs would therefore be welcome. This support could be provided by the research institutions, for instance, and possibly in collaboration with representatives from the different disciplines. SNSF (CH) even offers funding for community-based workshops for specific disciplines.

CONCLUSIONS

When comparing the approaches and characteristics of the implementation of the RDM Guide in different research organisations across Europe, it is obvious that there are many similarities. These can be considered as key messages and advice to other organisations that are in the process of integrating the RDM Guide into their organisational or national policies.

Based on these conclusions, Science Europe encourages other research organisations to follow the three steps mentioned at the beginning of this publication (page 5) when crafting DMP requirements: development, communication and implementation.

1. When **developing** RDM policies, collaborating within and beyond the own organisation is key, as involving all stakeholders concerned increases acceptance of the new policy.
2. When **communicating** on new requirements, research organisations should engage directly with all actors concerned and explain the underlying concepts and benefits. The actors essentially include scientific, legal, financial and communication staff.
3. When **implementing** RDM policies, both RFOs and RPOs need to work together if they want to provide sufficient support for researchers, such as training or online tools to set up and managing DMPs.

In short, aligning DMP requirements across Europe is an important step to support researchers in their RDM efforts. This report shows clear progress in the implementation and alignment of policies, however more can and needs to be done to streamline RDM across Europe.

It is only through concerted efforts that the ongoing movement towards Open Science can be further fostered. Regarding research data, Science Europe strongly recommends organisations that do not have RDM policies in place yet to use the RDM Guide when developing them, or to check the alignment of existing policies with the Guide. Science Europe will continue to provide support to its members in implementing the RDM Guide as part of its broad commitment to support its members in fostering Open Science.

NOTES & REFERENCES

1 http://scieur.org/rdm-guide

2 Science Europe has developed a Guidance Document Presenting a Framework for Discipline-specific Research Data Management. It encourages scientific communities to set up domain-specific data management protocols according to their particular needs. These protocols can be considered as DMP templates for a given discipline and are complementary to the DMP core requirements detailed in the RDM Guide.
http://scieur.org/guidance-rdmps

3 https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf, p.252

4 https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf, p.252

5 With the exception of the Swiss SNSF that developed its policy before the Guide was published.

6 https://www.e-infrastructures.at/en/

7 https://www.inist.fr

8 https://www.ouvrirlascience.fr/open-science/

9 DMPTuuli network group annually collects feedback from the researchers on the usability of the DMP template and guidelines.
https://www.dmptuuli.fi/

10 The UKB is the consortium of university libraries and the National Library of the Netherlands.
https://www.ukb.nl/research-data

11 https://dans.knaw.nl/en

12 see Research Data Policy: https://www.fwf.ac.at/en/research-funding/open-access-policy/research-data-management/ and Open Access to Research Data: https://www.fwf.ac.at/en/research-funding/open-access-policy/open-access-to-research-data/

13 http://www.snf.ch/en/theSNSF/research-policies/open_research_data/Pages/default.aspx

14 DMP OPIDoR is an online application that facilitates the drafting of DMPs and that is dedicated to the French scientific community and its partners.
https://dmp.opidor.fr/

15 https://www.dmptuuli.fi/

16 https://dmponline.dcc.ac.uk

17 https://digital.csic.es/

18 Guidance Document Presenting a Framework for Discipline-specific Research Data Management
http://scieur.org/guidance-rdmps

ANNEX 1: DMP CORE REQUIREMENTS

1. **Data description and collection or re-use of existing data**
   a. How will new data be collected or produced and/or how will existing data be re-used?
   b. What data (for example the kinds, formats, and volumes) will be collected or produced?
2. **Documentation and data quality**
   a. What metadata and documentation (for example the methodology of data collection and way of organising data) will accompany the data?
   b. What data quality control measures will be used?
3. **Storage and backup during the research process**
   a. How will data and metadata be stored and backed up during the research process?
   b. How will data security and protection of sensitive data be taken care of during the research?
4. **Legal and ethical requirements, codes of conduct**
   a. If personal data are processed, how will compliance with legislation on personal data and on data security be ensured?
   b. How will other legal issues, such as intellectual property right and ownership, be managed? What legislation is applicable?
   c. How will possible ethical issues be taken into account, and codes of conduct followed?
5. **Data sharing and long-term preservation**
   a. How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?
   b. How will data for preservation be selected, and where will data be preserved long-term (for example a data repository or archive)?
   c. What methods or software tools will be needed to access and use the data?
   d. How will the application of a unique and persistent identifier (such as a Digital Object Identifier (DOI)) to each data set be ensured?
6. **Data management responsibilities and resources**
   a. Who (for example role, position, and institution) will be responsible for data management (i.e. the data steward)?
   b. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

extract from RDM Guide: http://scieur.org/rdm-guide, p. 9/10

ANNEX 2: CRITERIA FOR THE SELECTION OF TRUSTWORTHY REPOSITORIES

1. **Provision of Persistent and Unique Identifiers (PIDs)**
   a. Allow data discovery and identification
   b. Enable searching, citing, and retrieval of data
   c. Provide support for data versioning
2. **Metadata**
   a. Enable finding of data
   b. Enable referencing to related relevant information, such as other data and publications
   c. Provide information that is publicly available and maintained, even for non-published, protected, retracted, or deleted data
   d. Use metadata standards that are broadly accepted (by the scientific community)
   e. Ensure that metadata are machine-retrievable
3. **Data access and usage licences**
   a. Enable access to data under well-specified conditions
   b. Ensure data authenticity and integrity
   c. Enable retrieval of data
   d. Provide information about licensing and permissions (in ideally machine-readable form)
   e. Ensure confidentiality and respect rights of data subjects and creators
4. **Preservation**
   a. Ensure persistence of metadata and data
   b. Be transparent about mission, scope, preservation policies, and plans (including governance, financial sustainability, retention period, and continuity plan)

extract from RDM Guide: http://scieur.org/rdm-guide, p. 13/14

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