



NBSOIL

Nature-Based Solutions
for Soil Management

D7.10 – Data Management Plan and use of AI 2

Deliverable [7.11]

31.05.2024



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Author(s)	Anna Osann (AgriSat) Elena Pareja-Serrano (AgriSat) Grzegorz Siebielec (IUNG) Karolina Świątek (IUNG)
Contact	anna.osann@gmail.com elena.pareja@agrisat.es gs@iung.pulawy.pl
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¹ R=Document, report; DEM=Demonstrator, pilot, prototype; DEC=website, patent filings, videos, etc.; OTHER=other

² PU=Public, CO=Confidential, only for members of the consortium (including the Commission Services), CI=Classified



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List of acronyms

MS – Milestone

WP – Work Package

DMP – Data Management Plan

KER – Key Exploitable Result

FAIR – FAIR principles: Findable, Accessible, Interoperable, and Reusable

DMO – Data Management Officer

NBS – Nature Base Solution

NBSOIL – Nature Based Solutions for Soil Management

IP – Impact Pathway

MOOC – Massive Open Online Course

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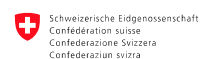
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1 Executive Summary

Focus

The report focuses on the application of the FAIR principles (Findable, Accessible, Interoperable, and Re-usable) in the process of elaboration, publication, and maintenance of the potential Key Exploitable Results (KER) of the project. FAIR principles are used as reference to ensure the accessibility of KERs, mainly in Open Access, while respecting the property rights of authors and data owners and their persistence after the project. In this way, a general protocol for the application of the FAIR principles has been determined which will be adjusted to the characteristics, development and publication process of each KER.

The guidelines proposed by the GO FAIR platform (“GO FAIR initiative: Make your data & services FAIR,” n.d.) and the template proposed by Guidelines on FAIR Data Management in Horizon 2020 Version 3.0 have been considered for the elaboration of this report. The document includes a brief introduction to the objectives of the NBSOIL project (section 2), a brief description of the key features of the KERs and presents the type of data collected across WPs, following the application of the FAIR principles (section 3) and of the FAIR principles together with the key actions that need to be addressed to guarantee their implementation (section 4). In addition, aspects of allocation of resources (section 5), data security (section 6) and ethics (section 7) are briefly included.

Up to date, a documentation process has been carried out for the proper planning of the publication of the project's products, which are summarised in this report. In addition, a Data Management Officer (DMO) and an independent external ethics advisor have been identified to ensure the application of the proposed protocol to ensure the correct application of the FAIR principles in the process of elaboration, publication and maintenance of the project's KERs. The tasks carried out in every KER will be included in the next versions of the DMP (Month 30 and 42), following the developments and timelines of the project.

Update since the first DMP version

The present report includes the updated version of the Data Management Plan (DMP) of the NBSOIL project. The new version of the report contains a description of data being collected in the project after the careful analysis of data types and formats generated across WPs. In general both qualitative and quantitative data, including laboratory data and field observations, surveys, workshop data, maps, videos, etc. are generated in NBSOIL. Spatial models and maps are generated in WP1 and WP5. WP2 is a rich data work module collecting raw data across NBS test areas, indexes of soil health based on the raw data, and NBS performance evaluations using NBS standards. WP3 generates survey data with practitioners and feedbacks from the Soil Academy participants. WP4 collects and utilizes digital data of soil monitoring. WP5 collects national and EU policy documents related to soil management and NBS. WP6 dedicated to communication and dissemination produces video materials encouraging involvement of soil advisors. For the data management and security purposes, during the project period data is stored on the online NBSOIL SharePoint with access only to project partners. Personal data collected from the workshop experts and the Soil Academy participants are used only for the engagement and communication and obviously are not shared publicly.



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2 Introduction

Over 60 – 70% of EU soils are estimated to be unhealthy (Orgiazzi et al, 2016), threatening ecosystem services essential to the interrelated challenges of climate change mitigation and adaptation, halting and reverting biodiversity loss, sustainable management of the water and nutrient cycles, preventing disasters such as floods, droughts, and forest fires, and providing timber, fibre, and food for healthy diets and adequate living environments for the population. In this regard, different strategies such as The Farm to Fork, EU 2030 Biodiversity and Soil Mission have set ambitious targets for pesticide (-50%) and fertiliser (-25%) reduction, increase in soil organic carbon (SOC, 0.1 – 0.4 % annual increase), and achieving 75% healthy or improving soils by 2030. Modelling exercises such as Ten Years for Agroecology (TYFA) (Poux and Aubert, 2018) show that would be achievable which considers that EU agriculture could give up synthetic inputs and still provide a healthy diet for all Europeans in spite of a decrease in production by 30%. To catalyse the transition towards sustainable soil management, the Soil Mission relies on increased cooperation and co-creation of solutions among researchers, land managers, soil advisors, the business sector, local authorities, and policymakers which must be aligned with the CAP, EU, and national post-pandemic recovery funds, and the measures taken to mitigate the crisis caused by the invasion of Ukraine.

In this context, NBSOIL project has defined its ambitions to generate impact and contribute to achieving the Soil Health Mission by integrating soil management knowledge and advice. The NBSOIL project develops a blended learning program to train soil advisors in soil health from a holistic point of view, aligned with agroecology through Nature Based Solutions (NBS), fully in line with the IUCN Global Standard for NBS (IUCN, 2020). To this end, NBSOIL consortium has focused their Impact Pathways (IP) building on previous research results and available Open Source technology (Impact Pathway 1 (IP1), providing Soil Health Living Labs facilitators (IP2), making soil monitoring and mapping tech user-friendly and inclusive (IP3) and embedding soil care across all land management and land related decision-making processes (IP4).

For the adequate management of knowledge and of intellectual property, and of other innovation-related activities arising in the project, Task 7.4 "Data Management and AI" within the WP7 "Project Management and Quality assurance" have been foreseen on the NBSOIL project. Task 7.4 is focused on monitoring the implementation of the principles governing intellectual property rights, including policies on publication, storage, persistence, and accessibility, with particular attention to open access policies and FAIR principles which are reported on the Data Management and AI (DMP) document. DMP is defined and maintained by the NBSOIL consortium to appropriately manage the research data generated during the project, and to make sure data and research outputs remain Findable, Accessible, Interoperable and Reusable (FAIR). The current report (Deliverable 7.10) is the first version of the DMP and includes a basic plan of the DMP which will be annually updated in M18 (D7.11), M30 (D7.12), and in M42 (D7.13) as the project progresses.



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3 Data Summary

The purpose of the data generated is to integrate soil management knowledge and advice to contribute to achieving the Soil Health Mission by developing a blended learning program to train Soil Advisors in soil health by the application of Nature Base Solutions (NBS) from a holistic point of view.

NBSOIL project has a highly multidisciplinary and holistic character, which will make use of currently available soil information and where different data and resources will be generated. All of this information will be catalogued and detailed in successive reviews of this document as the project evolves. Table 1 presents the KERs and their main characteristics as described in the Grant Agreement in relation to the connected data. NBSOIL project has also a strong Open Access ambition and therefore compliance with FAIR principles to ensure accessibility and reusability during and after the project is a key aspect.

Table 1. Description of main aspects of NBSOIL’s KERs for the definition of the Data Management Plan.

KER	WP	Description
Scientific publications	WP1, All	Text-based research outputs of knowledge based for Soil Health Indices.
SHI online tool	WP2	Libraries for the computation of the Soil Health Index.
Handbooks	WP1, WP2, WP4	Text -based research outputs such as the Soil and NBS Handbook and advanced modules of the MOOC will be PDF files between 2 and 10 MB depending on the images included.
Database	WP4 & al	Databases from: Field sampling (field research, field activities and training participants of MOOCs), specifically Numerical data - collected in approx 500 (including 1 per participant on a shared folder) files - less than 1GB per file; sensor data (weather, pH data, physical and chemical and biological indicators; Lab data: soil analysis including Soil Organic Carbon, Nitrogen and Phosphorus content; observational data: Biodiversity - counting of key species such as earthworms, nematodes; data from events and participants; External databases: other data from the European Environment Agency, the JRC, Life projects, UN and FAO databases; Remote sensors, images: satellite imagery data (1 GB/image); spatial multi-baseline data for the comparisons of land-use/landcover in all regions; quantifiable data for the analysis of biodiversity, climate change impacts, disaster risk reduction, food security, and of course, urbanisation-related impacts to the environment; high-resolution drone data (500 MB - 1GB per image); images of details such as soil close up, plants, insects, animals, fruits, etc (10-100Mb/image).



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Protocols	WP1	Text -based research outputs of sampling and testing protocols for soil health and biodiversity will be PDF files between 2 and 10 MB depending on the images included.
GIS Tool	WP4	API user-friendly GIS Tool as Data sets repository based on AgrisatWebGis.
ARIES NBSOIL modelling package	WP1	ARIES system, which uses semantics to make data FAIR through purely logical queries, which resolve into observation strategies through machine reasoning and logical inference for interactive modelling.
Marketplace	WP6	Platform, tool adapted and upgraded from TriplePerformance.fr platform using semantic mediawiki: Stop shop for soil health advice, to help on the collaboration among soil advisors, researchers, and managers and stakeholders.
Policy briefs	WP5	Text -based research outputs will be PDF files between 2 and 10 MB depending on the images included.

The project is expected to produce both qualitative and quantitative data, including laboratory data and field observations, surveys, workshop data, maps, videos, etc. Table 2 presents the type of data generated across the project WPs.

Table 2. Data produced in the different WPs.

WP	Partner	Data produced or collected	Purpose and use
WP1	BC3	Databases and maps produced by spatial models of soil properties	Produced to calibrate models across test areas and use to delineate areas suitable for replication of NBS. Provide examples of how to use maps and models in soil advisory practice
WP2	BOKU	Soil Health Index calculated for test areas	Developing simple tools to be learned and used by soil advisors for calculating effects of NBS on soil health



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WP2	IUCN	Outputs of NBS assessment using IUCN global standard for NBS tested in NBSOIL test areas	Providing tools for broader NBS effect assessment, including socio-economic and environmental aspects, to be made available for the Soil academy participants
WP2	BOKU, UNITO, FIBL, CDR, CAFS, SA, ALCN, CAN, ITAP	Soil data from field experiments testing NBS, data on agricultural practice	The data will be used to further document and evaluate the effects of NBS on soil health referring to cover crops and intercropping, paludiculture, bioremediation, green and blue infrastructure, organic fertilisers, forest diversification. The data will be used WP3 Soil Academy after integration
WP3	FIBL	Interview data with soil practitioners (up to 20 in each partner country)	Data used to assess existing soil advisory capacity and needs to be utilised for design of the Soil Academy modules
WP3	SA, REVOLVE	Registration data of MOOC and Soil Academy participants	Contact data and simple personal data collected only for MOOC and Soil Academy communication
WP4	AGRISAT	Satellite images and derivatives for the test areas	Data used for development of simple GIS tool to be used in soil advisor training and for the tool testing
WP4	ILOT	Drone multispectral images and derivatives for the test areas	Data used for development of simple GIS tool to be used in soil advisor training and for the tool testing
WP4	ITAP	Soil sensor data and derivatives for the test areas	Data used for development of simple GIS tool to be used in soil advisor training and for the tool testing



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WP5	UNITO	Spatial information layers (soil, land use) for selected urban test areas	Data used to demonstrate how to use soil information in improved spatial planning to be utilised for the Soil Academy purposes
WP5	IUCN	National and EU policy documents in .pdf format	Documents used to produce Module 4 content of the Soil Academy
WP6	REVOLVE	Videos describing NBS based techniques of soil management	Videos that address different project stakeholder groups used to inform viewers about NBS as a solution for soil regeneration in an accessible way, and encouraging the involvement of soil advisors, and other stakeholders

During the project period, data will be stored on the online NBSOIL SharePoint with access only to project partners. Copies on local devices will be allowed during processing of the data. Until released in edited and quality assured format on the NBSOIL website, it will follow internal host data management and standards (on password protected personal computers or other partner hosted computers in secured sites with limited access).

Personal data collected from the workshop experts and the Soil Academy participants should only be used for the engagement and communication and should not be shared publicly. Personal opinions should be anonymized. The appointed NBSOIL Ethics Advisor will review the main data collections including personal data from the project.

The size of the data is not yet known, but it is expected to be quite large, as in particular, WP1, WP2 and W4 are producing maps as results of their work, and WP2 is producing some videos and photos documenting regenerative effects NBS on soil. The project will primarily make use of Microsoft Office software for the processing and analysis of data from the test areas, workshops, the marketplace and evaluations done by the Soil Academy participants. Maps and videos may use other software and formats.

4 FAIR data

In this section, a draft of the actions foreseen for the application of the FAIR principles in the project's KERs publication process is presented. FAIR principles emphasise machine actionability (i.e. the ability of computer systems to find, access, interoperate and reuse data without human intervention or with minimal human intervention), as humans are increasingly reliant on computer support to process data as a result of increasing volume, complexity and speed of data creation ("FAIR Principles - GO FAIR," n.d.). They are thus of particular importance in NBSOIL because they are key aspects to guarantee the exploitation of the project's KERs in Open Access and their re-use both during and after the project, as well as to ensure the intellectual property



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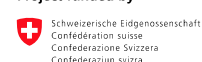
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of the consortium. This last is of special importance in NBSOIL due to the involvement of multiple actors and knowledge co-creation. For the correct handling of the data by FAIR principles, a general protocol has been defined as described next:

1. Identification of data collection requirements.
2. Definition of the data acquisition protocol and licence for data use.
3. Acquisition and receipt of data and acceptance of the data licence.
4. Normalisation of data to NBSOIL project standards (terminology, concepts, units, ...).
5. Data integration (if process is repeated).
6. Definition of metadata.
7. Publication by obtaining the identifier of the registration service.

In the following, three of the main FAIR principles applicable in the above steps are described: (1) Findable, (2) Accessible, (3) Interoperable, as key aspects for the achievement of the data reusability.

4.1 Making data Findable

Findable principle focuses on ensuring that KERs are findable and understandable by both humans and machines and, as far as possible, automatically. Thus, data needs to be accompanied by metadata to which globally unique and persistent identifiers are assigned, avoiding ambiguity in the meaning of the published data, helping others to understand exactly what data mean and properly cite, and helping computers to interpret data in a meaningful way. Globally unique identifiers can be obtained from a registry service using algorithms that ensure the uniqueness of the newly minted identifiers and their persistence in the future. Given the diversity of the typology of KERs, different registry services will be used to adapt to each type of KER. Table 3 presents the registry services and identifiers initially adopted for each KER in the project, which will be updated as the project evolves

Table 3. Registry services and identifiers&metadata adopted for every NBSOIL’s KER.

KER	WP	Identifier		Metadata	Language
		Type	Registry service		
Scientific publications	WP1	doi	Scientific journals, Zenodo, Researchgate	Automatically generated	English
SHI computation tool	WP2	url	GitHub	Read me	Phyton
Handbooks	WP1, WP2, WP4	url/doi	NBSOIL website	Automatically generated	English



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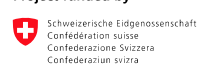
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Database	All	url	Zenodo, Global Open Data for Agriculture and Nutrition; Interest Group of the Research Data Alliance, JRC's EUSO	Read me	English, EUSO, INSPIRE
Protocols	WP1	url	Protocols.io	-	English
GIS Tool	WP4	url	NBSOIL website	Read me	English, EUSO, INSPIRE
ARIES NBSOILmodelling package	WP1	urn	k.LAB modelling platform*	Read me	English
Marketplace	WP6	url	Tripleperformance.fr	-	English
Policy briefs	WP5	url/doi	NBSOIL website	-	English

* <https://docs.integratedmodelling.org/technote/index.html>

4.2 Making data Accessible

Accessibility principle focuses on ensuring that data and metadata can be retrieved from their identifiers and that these identifiers use standardised communication protocols, i.e., open, free, and universally implemented.

In NBSOIL Project, most of the project's KERs will be shared in trusted repositories used to generate the unique identifier with already defined and standardised access protocols, as shown in Table 3. Experimental data will be served online in Zenodo, the OpenAIRE's trusted repository hosted in CERN. In case of using own repositories, such as the GIS Tool, open, free and universally protocols will be designed, which will also follow a multi-browser approach allowing accessibility for desktop and mobile devices across different browsers: Chrome, Firefox, Safari and also mobile versions.

In other hand, NBSOIL is committed to Open Access of project data and research outputs, using Creative Commons and Open Data Commons licences according to the guidelines of the Open Data Foundation and Open Knowledge Foundation. Thus, it is foreseen that licences for the use of the generated data are to be accepted by the partners in order to avoid conflict of interest as well as by third parties such as demo site owners or e-learners. To this end, the coordinator of each KER will be responsible for carrying out this task in collaboration with the Data Management Officer (DMO). In case a KER uses its own protocols, as ARIES and GIS Tool possibly will, it is foreseen that users have to register to authenticate the owner (or contributor) of each dataset. This last will be fundamental after the project.

The aspects described above will be detailed as the project evolves.



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4.3 Making data Interoperable

Interoperability principle focuses on ensuring that digital objects are understandable and accessible through standard communication protocols. To this end, digital objects have to be represented using a formal, accessible, shared, and widely applicable language for the adequate representation of the concepts that each object represents and to be easily reusable, both by humans and by machines. To this end, terms and concepts also have to comply with the principles of findability by adopting unique and persistent identifiers.

In NBSOIL project, this step is key for the integration of the data collected during the monitoring of the NBS, the interoperability within the consortium, as well as the integration of external databases. For this purpose, a robust data structure will be designed in coordination with WP4. WP4 will coordinate a database to integrate the description, data and management of pilot cases (pilot parcels) collected in the other WPs. Data integration within a soil health assessment framework to achieve an index-based output for usage of advisor and farmer in monitoring, verification and reporting of soil health advances will be developed in Task 1.5. Standardised communication protocol will be defined, following standards adopted for the project giving priority to worldwide standards such as those adopted in JRC's EUSO. URNs (Unique Resource Names) will be attached to each artefact and semantic annotation will allow findability via logical queries for modelling artefacts.

In addition, an important aspect of the project is the use of existing knowledge. Thus, special attention will be paid to correct cross-referencing (qualified references) as well as other metadata used in ARIES (i.e. k.LAB modelling platform) and GIS Tool.

In case of text documentation and metadata, the language used will be English. All KER or parts of KER that may be used by the public will be translated into the official languages of the consortium.

The aspects described above will be detailed as the project evolves.

5 Allocation of resources

The allocation of the resources is foreseen to be made on Agrisat servers. Agrisat resources, such as servers, will be available at the disposal of the project.

Braulio Moreno Simarro, member of AGRISAT, has been identified as the Data Management Officer (DMO) who will ensure compliance of the General Data Protection Regulation (GDPR). DMO will work together with dedicated personnel from IUNG-PIB to oversee data quality during the project and to resolve any problem related to the allocation of resources. IUNG-PIB will secure its maintenance after the project. The discussion about the costs of maintenance after the project is expected to be further, possibly in the second half of the project.

ARIES hosted resources will be served from the physical infrastructure supporting it, which is now also part of the UN Global Platform (more info in this blogpost: <https://aries.integratedmodelling.org/aries-for-seea-is-a->



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[sector-hub-of-the-un-global-platform/](#)) located at the Donostia International Physics Center (DIPC) Supercomputing Center.

6 Data security

To guarantee the security of the information, the necessary measures will be taken to control access and protect all the data collected in the project and stored in the project's information systems, such as the GIS tool. This information must also have the necessary backup copies to ensure compliance with FAIR principles and prevent the loss of information. Special attention should be paid to personal data (e.g., from problem owners and solution providers) which will be protected by technical and procedural means and will not be shared under any circumstances or stored beyond the project's lifetime. Data collected through project surveys will be stored and transmitted in forms without personal identifiers (e.g., aggregated data) through public deliverables and communication materials.

Long-term preservation. ensure compliance with the General Data Protection Regulation (GDPR). This same task will coordinate the aspects related to Responsible Research and Innovation (RRI), and Intellectual Property Rights (IP) developed in Task 6.3, taking care of the use of personal data.

7 Ethics

The four described Impact Pathways in the NBSOIL project embrace democratisation of knowledge, co-creation of knowledge in open innovation spaces, inclusivity of technology, and embedding soil care in decision-making. This implies a high diversity of data produced and the involvement of multidisciplinary teams, so ensuring compliance with ethical principles from the beginning of the project, as well as frequently updating any additional ethical issues that may emerge in the course of the grant, is key to the proper development of the proposed activities. Basic ethical principles have been described in the Article 14 of the Annotated Model Grant Agreement, and the applicable EU, international, and national laws applicable to the ethical issues identified in the Ethics Summary Report and to any additional ethical issues that may emerge in the course of the grant rigorously following the guidance provided in the European Commission Ethics Self-Assessment Guidelines. The compliance with the aforementioned ethical standards also includes activities developed in non-EU countries. The Non-EU countries involved in NBSOIL (UK and Switzerland) are highly developed countries that share many standards with the EU; however, particular attention will be given to existing and future differences in legislation concerning relevant ethical issues.

To this end, the consortium counts with Benedetta Giovanola, from the University of Macerata (Italy), as an independent external ethics advisor to oversee all activities. Regarding Human and Personal Data, Task 8.2 and Braulio Moreno Simarro member of AGRISAT will be the Data Management Officer (DMO) who ensure



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compliance with the General Data Protection Regulation (GDPR). This same task will coordinate the aspects related to Responsible Research and Innovation (RRI), and Intellectual Property Rights (IP) developed in Task 6.3, taking care of the use of personal data. Finally, AI used in NBSOIL will be developed by BC3- in the framework of the ARIES project, which is aligned with the seven key requirements defined by the EC for trustworthy and human centric artificial intelligence:

1. Human agency and supervision.
2. Technical soundness and safety.
3. Privacy and data governance.
4. Transparency.
5. Diversity, non-discrimination and equity.
6. Social and environmental well-being.
7. Accountability To implement these requirements.

In addition, the use of AI will be monitored by the ethics advisor in collaboration with BC3 and the DMO.

8 Conclusions

This document will serve to collect, catalogue, and manage through best practices the data used within the NBSOIL project. In successive revisions, this catalogue and how it will be managed will be specified.

A documentation process has been carried out along this time for the proper planning of the publication of the project's products, which are summarized in this report. In addition, a Data Management Officer and an independent external ethics advisor have been identified to ensure the application of the proposed protocol to ensure the correct application of the FAIR principles in the process of elaboration, publication and maintenance of the project's KERs.

9 References

FAIR Principles - GO FAIR [WWW Document], n.d. URL <https://www.go-fair.org/fair-principles/> (accessed 5.23.23).

GO FAIR initiative: Make your data & services FAIR [WWW Document], n.d. URL <https://www.go-fair.org/> (accessed 5.23.23).

Wilkinson, M.D., Dumontier, M., Aalbersberg, I.J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten, J.-W., Da Silva Santos, L.B., Bourne, P.E., Bouwman, J., Brookes, A.J., Clark, T., Crosas, M., Dillo, I., Dumon, O., Edmunds, S., Evelo, C.T., Finkers, R., Gonzalez-Beltran, A., Gray, A.J.G., Groth, P., Goble, C., Grethe, J.S., Heringa, J., 'T Hoen, P.A.C., Hooft, R., Kuhn, T., Kok, R., Kok, J., Lusher, S.J., Martone, M.E., Mons, A.,



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Packer, A.L., Persson, B., Rocca-Serra, P., Roos, M., Van Schaik, R., Sansone, S.-A., Schultes, E., Sengstag, T., Slater, T., Strawn, G., Swertz, M.A., Thompson, M., Van Der Lei, J., Van Mulligen, E., Velterop, J., Waagmeester, A., Wittenburg, P., Wolstencroft, K., Zhao, J., Mons, B., 2016. The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* 3, 160018. <https://doi.org/10.1038/sdata.2016.18>

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