Data Management Plan Thomas More – IOF C3 project Pinso

General Project Information

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Project number[1] and title: WU8RAGR02595 Pinso: Processing of Insects for production of Sustainable Oil: technological and economical viability (Pinso)

Funder(s) GrantID[2]: C3/23/016

Affiliation(s): Sabine Van Miert: Expertisecentrum Duurzame Biomassa en Chemie; Thomas More; Kleinhoefstraat 4 – 2440 Geel / Jo Van Caneghem: Duurzaam Materialenbeheer (SeMPeR) en Giuseppe Granata: Procestechnologie voor Duurzame Systemen (ProcESS), Campus Groep T Leuven, Andreas Vesaliusstraat 13 – bus 2600 3000 Leuven

Please provide a short project/research description:

This project aims to demonstrate that insect lipid production at pilot scale is feasible and that further upscaling is technologically and economically viable. Thomas More and KU Leuven join forces to improve the relevance and impact of insects and insect lipids in a circular bio-economy. This project will confirm the potential of insect lipids and will speed up valorisation and commercialisation in diverse markets.

Versioning of the DMP: Initial DMP

This is the initial DMP of the project Pinso. This initial DMP was written and submitted within the first 3 months of the research project.

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[1] "Project number" refers to the internal number ('intern nummer') at Thomas More. You can only provide one internal number.
[2] Funder(s) GrantID refers to the number of the project at the funder(s), here one can specify multiple GrantIDs if multiple funding sources were used.

1. Research Data Summary

1.1. List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

				Only for digital data	Only for digital data	Only for digital data	Only for physical data
Dataset Name	Description	New or reused	Digital or Physical	Digital Data Type	Digital Data format	Digital data volume (MB/GB/TB)	Physical volume
Mealworm (MW) and Black Soldier Fly (BSF) larvae	Live MW and BSF larvae will be used as starting point for experimental work to generate MW and BSF oil. Data on these MW will stored in excel or word files	Generate new data	Digital	Experimental	Tabular data (.por, .spss, .tab, .csv, …)	<100MB	
MW and	Raw and	Generate new	Digital	Experimental	Tabular data	<100MB	

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BSF Oil samples	refined oil samples are generated and parameters will be experimentally determined and recorded in excel sheets and word documents	data			(.por, .spss, .tab, .csv, …)		
MW and BSF Oil samples	Effective oil samples – will be provided to other people or stored with limited shelf life						Physical data; will be stored at cold temperature (4-8°C) – about 5 - 7kg per sample. May be further distributed to other parties or stored until finishing characterisation.
Processing data	Quantitative data based on different processing steps from killing insects up to extracted and purified oils	Generate new data	Digital	Experimental	Documentation & computational script	<100MB	

Literature data	Qualitative and quantitative data on methods, procedures and technical outcomes	Reuse existing data	Digital	Compiled/aggregated data	Textual data (.rtf, .xml, .txt, ...)	<100MB	
Chemical data	Quantitative data on composition and purity of samples (oil)	Generate new data	Digital	Observational	Tabular data (.por, .spss, .tab, .csv, ...)	<100MB	
Model output	Quantitative data on sustainability (LCA) and technical (TEA) aspects of processing technologies	Generate new data	Digital	Simulation data	Tabular data (.por, .spss, .tab, .csv, ...)	<1GB	.umberto and .xlsx files for LCA analyses
Interview	Data from questionnaires on technical applications of oils	Generate new data	Digital	Observational	Textual data (.rtf, .xml, .txt, ...)	<100MB	

1.2. If you **reuse existing data**, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type.

<u>Within the project data will be collected from literature and/or from databases. In the case of literature information this will be scientific publications which are accessible and in the case of commercial databases, valid licenses will be purchased. For the LCA, data will be retrieved from ecoinvent (www.ecoinvent.org). Specific information and data regarding industrial oil processing techniques, determination of oil quality parameters applications of oils within end-products may be requested from companies or other research institutes. Use of this information may be restricted to the partners within the consortium and this will be agreed upon with the companies/research institutes. Within the project it may be decided to make use of interviews and questionnaires of key players in the subject. Participants to these surveys will complete/sign an informed consent. The written reports of these activities do not contain personal data. Only general findings will be included in potential research publications.</u>

1.3. Are there any **ethical issues** concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? Describe these issues in the comment section. Please refer to specific datasets or data types when appropriate.

☐Yes, human subject data and/or personal data

☐ Yes, animal data

☐ Yes, dual use

☒ No

Comment section:
Click or tap here to enter text.

1.4. Will you process **personal data**? If so, briefly describe the kind of personal data you will use in the comment section. Please refer to specific datasets or data types when appropriate.

☐Yes

☒No

Comment section:

1.5. Does your work have potential for **commercial valorization** (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

☒Yes

☐No

Comment section:

The project partners shall agree in a separate agreement on the allocation and terms of exercising ownership of joint project results. This agreement will be discussed with the technology transfer offices of KU Leuven and Thomas More and shall specify, inter alia, the applicable arrangements in case of the use of the joint results as well as those applicable to the allocation and assumption of expenses in connection with the protection and maintenance of such jointly generated results. In any case, joint owners shall be entitled to use joint results for non-commercial research activities on a royalty-free basis, and without requiring the prior consent of the other joint owner(s).

1.6. Do existing **third party agreements** restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements/ research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

☐Yes

☒No

Comment section: Ecoinvent data used for life cycle impact assessment are accessed via a commercial licence, which allows unlimited use of ecoinvent data in funded research projects.

Click or tap here to enter text.

1.7. Are there any other **legal issues**, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

☐Yes

☒No

Comment section:

Click or tap here to enter text.

2. **Documentation and Metadata**

2.1. Describe the **documentation** that will be created for the data. Describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g., in terms of documentation levels and types required, procedures used, "Electronic' Lab Notebooks, README.txt files, Codebook.tsv etc. where this information is recorded).

This project will generate diverse datatypes, e.g.

Physical:

- Hardcopy notebooks, stored on-campus, researcher-only access (by keeping notebooks in a closed closet and room to which only authorized personel has access)
- Observational data: recorded in notebooks (researcher-only access as described above)
- Physical samples (eg. oil samples will be stored during characterization in a lab environment to which only authorized personel has access. Samples may be distributed to third parties or may be destroyed when having no further use

Digital: (preferably stored as open format: csv, txt, …):

- Digitized results (e.g. measurements of oil parameters, yields of processes, …): csv
- Data output from instruments and their settings
- LCA models output: .umberto files
- Documentation: Study set-up and methodology, SOPs, lab protocols: stored as .doc and .pdf, photo's stored as .jpg or .tif
- Papers and reports: output will be stored as .doc and .pdf

2.2. Will a **metadata** standard be used to make it easier to find and reuse the data? If so, please specify (where appropriate per dataset or data type) which metadata standard will be used. If not, please specify (where appropriate per dataset or data type) which metadata will be created to make the data easier to find and reuse.

☐Yes

☒No

Comment section:

Click or tap here to enter text.

3. Data storage & back-up during the research project

3.1. Where will the data be **stored** during research? Explain in the comment section.

☒ In a cloud service offered by Thomas More (Microsoft 365: SharePoint)

☐ Centrally on storage facilities of Thomas More

☐ Centrally on storage facilities of the research unit

☐ On storage facilities at the regional/national level

☐ On discipline-specific storage facilities

☐ At an external data centre

☒ In an external cloud service

☐ Other (please specify)

Comment section:

TMK uses the cloud system Sharepoint Online, part of Microsoft 365 Suite. To ensure continuity one supervisor of each institution, being the contact person for this project, will organize the preservation during and after the project of their generated data. Both digital-born and digitized data will be stored primarily on a private storage environment, with an automated back-up and versioning system, provided by the ICT facilities of each partner during the project.
As this project involves multiple partners, procedures will be set-up that allow sharing and accessing of the data of the other partners using the cloud system Sharepoint Online (Microsoft 365) at Thomas More. On this system user authentication will be implemented to allow access for all partners. The access to the data will be combined with user right management, so that different users can have

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different CRUD-permissions (Create-Read-Update-Delete) to the data and the SharePoint Online Site collection.

Intermediate data such as primary results from LCA and TEA modeling will be stored in the KU Leuven cloud system (Sharepoint online).

3.2. How will the data be **backed up**?

Data will be backed up using cloud service offered by Thomas More (Microsoft 365: SharePoint/OneDrive/Teams). These cloud services take automatic backups. Data in OneDrive/Teams/SharePoint will be stored for 93 days after removal from their original location, and can be recovered from the recycle bin. If data cannot be recovered from the recycling bin, the data owner can contact Microsoft Support to ask for recover. Data stored in the KU Leuven cloud system are backed up following the standard procedure provided by KU Leuven ICTS for my storage solution.

3.3. Is there currently sufficient storage and backup **capacity** during the project? If yes, specify concisely. If no or insufficient storage or backup capacities are available, then explain how this will be taken care of.

☒Yes

☐No

Comment section:

Cloud service offered by Thomas More and KU Leuven each have 5 TB storage and backup capacity through the corporate Office 365 licence. This is sufficient for the data created during the project.

3.4. How will you ensure that the data are **securely stored** and not accessed or modified by unauthorized persons?

Access to the data stored in the cloud service offered by Thomas More (corporate Office365 storage) is arranged via the Azure Active Directory and Multi Factor Authentication.

Most data will be experimental data. Data that could contain sensitive information, eg a survey, will be kept confidential and stay in possession of the responsible partner (and stored at SharePoint). Only generated data will be shared with the partners and/or will be used for publication/communication.

3.5. What are the **expected costs** for data storage and backup during the research project? How will these costs be covered?

No extra costs are to be expected since the cloud service offered by Thomas More or KU Leuven will be used.

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4. Data preservation after the end of the research project

4.1. **Which data** will be retained for at least ten years (or longer, in agreement with other retention policies that are applicable) after the end of the project? In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies,...).

The Thomas More research data management policy expects that relevant research data generated are retained for a period of minimally 10 years after the end of the project, in a safe, secure & sustainable way for purposes of reproducibility, verification, and potential reuse. In compliance to this policy all new generated, digital data will be stored for 10 years after the end of the project.

Physical samples (eg mealworms, oils) are consumed during the project or are generated as proof-of-concept and are of no use after the project (and will deteriorate in time).

4.2. **Where** will these data be archived (stored and curated for the long-term)?

The data will be stored on SharePoint (with automatic back-up procedures) for at least 10 years, conform the Thomas More RDM policy.

4.3. What are the **expected costs** for data preservation during the expected retention period? How will these costs be covered?

No extra costs are to be expected since the cloud service offered by Thomas More will be used.

5. Data sharing and reuse

5.1. Will the data (or part of the data) be **made available** for reuse after/during the project? In the comment section please explain per dataset or data type which data will be made available.

☒ Yes, in an Open Access repository

☐ Yes, in a restricted access repository (after approval, institutional access only, …)

☒ Yes, upon request by mail

☐ No (closed access)

☐ Other (please specify)

Comment section:

Part of the data will be made available and may comprise:

- Generalised results and conclusions thereof
- Publications

Information that will not be made available to the public are:

- Raw experimental data
- Data that was obtained from other parties that are subject to restrictions in further use

5.2. If you answered 'Yes, in a restricted access repository' or 'Yes, upon request by mail', please specify who will be able to access the data and under what conditions. Explain the procedures to control access.

Publications (scientific and/or sector) will be launched in open access journals as much as possible; policy letters -if relevant- via open communication channels. The dissemination of the results and conclusions will be performed via scientific fora. In case persons have specific questions related to the project data/results they can send the corresponding author or relevant project partner a request for additional information and these requests will be evaluated and answered question by question.

5.3. Are there any factors that **restrict or prevent the sharing** of (some of) the data (e.g. as defined in an agreement with a third party, legal restrictions)? Please explain per dataset or data type where appropriate.

☐ Yes, Privacy aspects

☒ Yes, Intellectual Property Rights

☐ Yes, Ethical aspects

☐ Yes, Other

☐ No

Comment section:

The raw data that is generated will form the basis for subsequent valorisation purposes. Therefore, raw data will not be made available to the public, but will only be available to project partners. From these raw data papers and communications will be generated for wider dissemination.

Depending on the valorisation strategy raw data may be made available to other parties if proper arrangements are in place.

5.4. If the data (or part of the data) will be made available for reuse after/during the project, explain **where the data will be made available**. If already known, provide a repository per dataset or data type.

Publications (scientific and/or sector) will be launched in open access journals as much as possible; policy letters -if relevant- via open communication channels. The dissemination of the results and conclusions will be performed via scientific fora. In case persons have specific questions related to the

project data/results they can send us a request for additional information and these requests will be evaluated and answered question by question.

5.5. **When** will the data be made available?

☒ Upon publication of research results

☐ After the project is finished

☐ Other (please specify)

Comment section:

Click or tap here to enter text.

5.6. Which **data usage licenses** are you going to provide? If none, please explain why.

The potential valorisation options for the project data will be evaluated during the project.

Valorisation can include:

1) Contract research or service agreements (fee-for-service) with individual companies.

2) Participation to international consortia, eg within the framework of EU Horizon projects or Interreg-programmes.

3) Creation of a joint-venture, where, together with one or more private companies, a combination can be made of different inputs per partner such as knowledge, patents, investment capital and marketing strategies in a new venture.

4) Creation of a spin-off: a commercial insect processing plant for production of insect lipids on a demonstration scale.

5) Patenting: if ideas and procedures are deemed novel and innovative enough, patenting will be considered.

6) Licensing to existing companies and collecting royalties thereof.

All described valorisation options put restrictions on the free distribution and sharing of raw data and knowledge. Before sharing data, possible impacts on the above mentioned valorisation options must be evaluated.

5.7. Do you intend to add a **PID/DOI/accession number** to your dataset(s)? If already available, you have the option to provide it in the comment section.

☐ Yes

☒ No

Comment section:

Click or tap here to enter text.

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5.8. What are the **expected costs** for data sharing? How will these costs be covered?

Not applicable.

6. Responsibilities

6.1 Who will manage data documentation and metadata during the research project?

There will be a shared responsibility regarding the data documentation and metadata. On one hand the researchers are responsible for their own data and on the other hand the partner-organisations as the researchers are working at the behest of their organization. As different partners are working together in a consortium TMK will take the lead to ensure that all partners are handling the data as described in the DMP.

For TMK the project leader will ensure the correct data documentation as they handle in behalf of TMK.

6.2 Who will manage data storage and backup during the research project?

There will be a shared responsibility regarding the data storage and backup between the researchers/principal investigator and TMK. For TMK the project leader will ensure the correct data storage and backup as the project leader bears the end responsibility.

6.3 Who will manage data preservation and sharing?

There will be a shared responsibility regarding the data preservation and sharing between the researchers/principal investigator and TMK. For TMK the DPO will ensure the correct data preservation and sharing as they handle in behest of TMK (dpo@thomasmore.be). The project leader bears the end responsibility.

6.4 Who will update and implement this DMP?

The project leader bears the end responsibility of updating and implementing this DMP. The DMP will be updated during and at the end of the project.

6.5 Which additional resources are needed for the execution of the Data Management Plan?

No additional requirements are needed for the execution of the DMP.

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6.6 Did you read the Research Data Management Vision text of Thomas More?

☒Yes

☐No

7. GDPR

7.1 Have you registered personal data processing activities for this project?

☐Yes

☒No

☐Not applicable

Appendix 1: Glossary

Accession number: A systematic (computer-readable) number or code that uniquely identifies an entry in a particular database[3]. Accession numbers are commonly used in the Biomedical and Life sciences.

ARK: Archival Resource Key

Dataset: Data and objects generated or collected by researchers in the course of their investigations, regardless of their form or method, that form the object on which researchers test a hypothesis. This includes the full range of data: raw, unprocessed datasets, proprietary generated and processed data and secondary data obtained from third parties[4].

Data format: The way in which the data is encoded for storage, often reflected by the filename extension (for example pdf, xls, doc, txt, or rdf)[5].

Data usage license: A data usage license indicates whether the data can be reused or not and under what conditions. If no licence is granted, the data are in a grey zone and cannot be legally reused. Do note that you may only release data under a licence chosen by yourself if it does not already fall under another licence that might prohibit that.

Data types: Data are often grouped by type (observational, experimental etc.), format and/or collection/generation method.

Digital Data Type: When focussing upon the mode of data collection, one distinguishes between data created via[6]:

- Observations: These data are captured in real-time, either by human observation and surveys, or instruments or sensors. For this reason, they are usually irreplaceable and most important to store safely. Examples: sensor readings, survey results, audio and/or video recordings of interviews.
- Experiments: These data are typically generated in the laboratory under controlled conditions. They often are reproducible, but this procedure can be expensive or time-consuming. Examples: gene sequences, chromatograms, magnetic field readings.
- Derivation or compilation: These data are generated by combining multiple existing datasets. Examples: text and data mining, compiled database.
- Computations, models or simulations
  These data are machine-generated from test models. The output files are likely to be reproducible as long as the model and inputs are preserved. Therefore, the large-volume output files can often be discarded when wrapping up your research project and selecting data for long-term preservation. Examples: climate models, economic models.

Documentation:

Documentation for data is needed to understand data and enable re-use. This may include information on the methodology used to collect the data, analytical and procedural information,

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[3] https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095346934
[4] Flemish Open Science Board Metadatamodel for research datasets
[5] Science Europe RDM Practical guide, p.18
[6] https://bibliotheek.uhasselt.be/en/collect

definitions of variables, units of measurement, and so on. This information can be captured and recorded in different ways, for example in a database with links to each item, a 'readme' text file, file headers, code books, or lab notebooks. Documentation can thus be very rudimentary (a README-file provided with the data that generally describes it) or highly specific (structured metadata as generated by specific measurement instruments).

DOI: Digital Object Identifier

A name (not a location) for an entity on digital networks. It provides a system for persistent and actionable identification and interoperable exchange of managed information on digital networks. A DOI is a type of Persistent Identifier (PID) issued by the International DOI Foundation. This permanent identifier is associated with a digital object that permits it to be referenced reliably even if its location and metadata undergo change over time. SYNONYM. DOI[7]

Dual use:

"Dual use items" are items, including software and technology, which can be used for both civil and military purposes. The term "misuse" is defined as "research that could be misused for unethical purposes"[8].

Ethical aspects:

Ethical aspects in research data management may include:

- processing of 'special categories' of personal data (formerly known as 'sensitive data')
- processing of personal data concerning children, vulnerable people or people who have not given their consent to participate in the research
- complex processing operations and/or the processing of personal data on a large scale and/or systematic monitoring of a publicly accessible area on a large scale
- data processing techniques that are invasive and deemed to pose a risk to the rights and freedoms of research participants, or techniques that are vulnerable to misuse
- collecting data outside the EU or transferring personal data collected in the EU to entities in non-EU countries[9]

Intellectual Property Rights:

The most common intellectual property rights are those protecting a (technical) invention, a trademark, a new plant variety, (industrial) designs and literary/artistic works. If you are collaborating with external partners, it is important to clarify who owns the IPR of the creations resulting from the research[10].

Open access:

The practice of providing online access to research outputs, free of charge to the end-user, and without any legal or technical obstacles, such as the requirement to have a user account or to solve a captcha[11].

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[7] https://codata.org/rdm-glossary/digital-object-identifier/

[8] https://bibliotheek.uhasselt.be/en/ethical-and-legal

[9] https://ec.europa.eu/info/sites/default/files/5._h2020_ethics_and_data_protection_0.pdf

[10] https://bibliotheek.uhasselt.be/en/ethical-and-legal

[11] https://erc.europa.eu/managing-your-project/open-science
https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/our-digital-future/open-science/open-access_en

Metadata:

Metadata are data about data. Research data need metadata to become findable, accessible, interoperable and reusable - by humans and machines. Metadata play an important role in making your data FAIR. Metadata have to be added continuously to your research data, not just at the beginning or at the end of a project. Metadata can be added manually or automatically, and preferably according to a disciplinary standard. From a FAIR perspective, metadata are more important than your data, because metadata would always be openly available and they link research data and publications in the Internet of FAIR Data and Services. The distinction between data and metadata is not ontological, but it is grounded in use. What is "data" and what is "metadata" is thereby a matter of perspective: Some researchers' metadata can be other researchers' data[12].

While data documentation is meant to be read and understood by humans, metadata (which are sometimes a part of the documentation) are primarily meant to be processed by machines[13]. For more information please visit: https://www.howtofair.dk/how-to-fair/metadata/

ORCID: Open Researcher and Contributor ID[14]

Physical, non-digital, or analogue or data or research materials:

Physical data are equally considered research data. Obviously, these data require a completely different approach regarding, for example, storage and preservation. Examples: paper-based questionnaires and notes, archaeological findings, art works (e.g. paintings, sculptures, photographs), protein and blood samples, nucleic acids, building plans, recordings on tapes or discs[15].

Personal data:

Personal data is any information that relates to an **identified or identifiable living individual**. Different pieces of information, which collected together can lead to the identification of a particular person, also constitute personal data.

Personal data that has been de-identified, encrypted or **pseudonymised** but can be used to re-identify a person remains personal data and falls within the scope of the GDPR.

Personal data that has been rendered **anonymous** in such a way that the individual is not or no longer identifiable is no longer considered personal data. For data to be truly anonymised, the anonymisation must be irreversible[16].

Examples:

- a name and surname;
- a home address;
- an email address such as name.surname@company.com;
- an identification card number;
- location data (for example the location data function on a mobile phone)*;

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[12] https://www.howtofair.dk/how-to-fair/metadata/

[13] https://www.howtofair.dk/how-to-fair/metadata/

[14] https://orcid.org/

[15] https://bibliotheek.uhasselt.be/en/collect

[16] https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-personal-data_en#examples-of-data-not-considered-personal-data

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- an Internet Protocol (IP) address;
- a cookie ID*;
- the advertising identifier of your phone;
- data held by a hospital or doctor, which could be a symbol that uniquely identifies a person.

Persistent identifier: A persistent identifier is a long-lasting reference to a digital object that gives information about that object regardless of what happens to it. Developed to address "link rot," a persistent identifier can be resolved to provide an appropriate representation of an object whether that object changes its online location or goes offline.[17]

Research data:

Research data are any information collected or generated for the purpose of analysis, in order to generate or validate scientific claims. It includes digital and physical data. Research data encompass the whole spectrum ranging from raw data to the processed and analysed data. Examples include survey results, statistics, measurements, notebooks, images, texts, computer generated data, simulations, software developed for research purposes, computational metadata, prints, video- and audiotapes, coding of textual information, organisms, gene sequences, synthetic compounds, samples, patients data, etc.[18].

Restricted access:

Open Access, but with restrictions. Often the Author wants to control the people who have access to for example a dataset. Access is provided in exchange for an e-mail address, to keep in touch with other people who are interested[19].

Valorization: When your research is of interest for society in general or for a specific company, there is a possibility of valorization[20].

Volumes: Volumes can be expressed in storage space required (bytes), and/or in numbers of objects, files, rows, and columns[21].

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[17] https://casrai.org/term/persistent-identifier/
[18] Research Data Management KU Leuven
[19] https://wiki.surfnet.nl/display/standards/info-eu-repo/#infoeurepo-AccessRights
[20] https://bibliotheek.uhasselt.be/en/ethical-and-legal
[21] Science Europe RDM Practical guide, p.18