# FWO DMP Template - Flemish Standard Data Management Plan

## Version KU Leuven

Project supervisors (from application round 2018 onwards) and fellows (from application round 2020 onwards) will, upon being awarded their project or fellowship, be invited to develop their answers to the data management related questions into a DMP. The FWO expects a **completed DMP no later than 6 months after the official start date** of the project or fellowship. The DMP should not be submitted to FWO but to the research co-ordination office of the host institute; FWO may request the DMP in a random check.

At the end of the project, the **final version of the DMP** has to be added to the final report of the project; this should be submitted to FWO by the supervisor-spokesperson through FWO's e-portal. This DMP may of course have been updated since its first version. The DMP is an element in the final evaluation of the project by the relevant expert panel. Both the DMP submitted within the first 6 months after the start date and the final DMP may use this template.

The DMP template used by the Research Foundation Flanders (FWO) corresponds with the Flemish Standard Data Management Plan. This Flemish Standard DMP was developed by the Flemish Research Data Network (FRDN) Task Force DMP which comprises representatives of all Flemish funders and research institutions. This is a standardized DMP template based on the previous FWO template that contains the core requirements for data management planning. To increase understanding and facilitate completion of the DMP, a standardized **glossary** of definitions and abbreviations is available via the following link.

| 1. General Project Information | |
|---|---|
| Name Grant Holder & ORCID | **Lauren Michiels, https://orcid.org/0000-0002-4999-8532** |
| Contributor name(s) (+ ORCID) & roles | **Greetje Vande Velde, https://orcid.org/0000-0002-5633-3993, promotor**<br>**Pedro Elias Marques, https://orcid.org/0000-0002-5613-8012, co-promotor** |
| Project number [1] & title | Unravelling dynamic host-pathogen interactions of influenza-associated pulmonary aspergillosis with advanced optical imaging in precision-cut lung slices |
| Funder(s) GrantID [2] | 1199825N |
| Affiliation(s) | ☒ KU Leuven<br>☐ Universiteit Antwerpen<br>☐ Universiteit Gent<br>☐ Universiteit Hasselt<br>☐ Vrije Universiteit Brussel<br>☐ Other:<br>ROR identifier KU Leuven: 05f950310 |
| Please provide a short project description | In recent years, we have seen that patients with severe influenza have a 19% risk to develop a severe superinfection with the fungus Aspergillus fumigatus, although these patients are not typically immune suppressed. Even with standard-of-care antiviral and antifungal treatment, mortality of influenza-associated pulmonary aspergillosis (IAPA) is unacceptably high at 51%. We hypothesize that the host immune response plays an essential role in driving IAPA severity. Indeed, previous results in our image-guided IAPA mouse model suggest hyperinflammation and defects in phagocytosis as the main drivers of the disease. To further unravel these findings, we need spatial and dynamic insights in the host-pathogen relationship at a high cellular resolution. Therefore, I innovated precision-cut lung slices (PCLS), a 3D ex vivo lung tissue model, for our IAPA mouse model. This IAPA-PCLS toolbox will now be applied to unravel the dynamic host-pathogen interactions, specifically focusing on the early innate immune response, during the superinfection through state-of-the-art confocal microscopy. Ultimately, new insights in IAPA immunopathogenesis will be at the basis for developing new therapeutic strategies aimed at restoring an effective host response, and I will use the IAPA PCLS model to evaluate the potential therapeutic effect of immunomodulation on disease outcome. |

[1] "Project number" refers to the institutional project number. This question is optional. Applicants can only provide one project number.

[2] Funder(s) GrantID refers to the number of the DMP at the funder(s), here one can specify multiple GrantIDs if multiple funding sources were used.

## 2. Research Data Summary

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 [3].

| | | | | 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 |
| | | ☐ Generate new data<br>☐ Reuse existing data | ☐ Digital<br>☐ Physical | ☐ Audiovisual<br>☐ Images<br>☐ Sound<br>☐ Numerical<br>☐ Textual<br>☐ Model<br>☐ Software<br>☐ Other: | | ☐ < 1 GB<br>☐ < 100 GB<br>☐ < 1 TB<br>☐ < 5 TB<br>☐ > 5 TB<br>☐ NA | |
| Descriptive data | observations on health of mice in experiment: body weight, respiratory parameters and condition | Generate new data | Digital | Numerical, textual | .pdf<br>.docx<br>.pptx<br>.xlsx<br>.pzfx | < 100 GB | |
| Standard laboratory screening | Colony forming units (CFU), blood cell counts, viral titres | Generate new data | Digital and physical | Numerical, textual | .pdf<br>.docx<br>.pptx<br>.xlsx<br>.pzfx | < 100 GB | Lab notebook |

[3] Add rows for each dataset you want to describe.

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| Protocols | Written and digitalized protocols | Generate new data + reuse old | Digital and physical | Textual | .pdf<br>.pptx<br>.xlsx<br>.docx | < 1 GB | Lab notebook |
| In vivo imaging data | Large volume *in vivo* imaging data (raw and processed) from Micro-CT and BLI | Generate new data | Digital | Images, numerical, textual | .txt<br>.tiff<br>BMP files<br>.png<br>.pzfx<br>.roi<br>.jpeg | > 5 TB | |
| Microscopy | Confocal fluorescence microscopy images. Conventional light microscopy images of histology slides. | Generate new data | Digital | Images, textual | .ims<br>.txt<br>.tif<br>.png<br>.jpeg<br>.avi | > 5 TB | |
| Immunological data | Flowcytometry data, cytokine assays … | Generate new data | Digital | Numerical, textual, images | .fcs<br>.xlxs<br>.pptx<br>.pzfx | < 1 TB | |
| Scripts | ImageJ scripts written for analysis microscopy images (e.g. cell counting macros) | Generate new data | Digital | Textual | .ijm | < 1 GB | |
| PCLS | Precision-cut lung slices from mice | Generate new data | Physical | / | / | / | Fixed after imaging and stored at 4°C |
| Histology | Organs/tissues for histology + embedded samples and stained histology slides | Generate new data | Physical | / | / | / | Fixed organs are stored at 4°C. Embedded samples and histological slides are stored at room temperature in |

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| | | | | | | | a stock room. |
| Samples | Lung homogenates, blood, serum, bronchoalveolar lavage fluid. | Generate new data | Physical | / | / | / | Frozen sample tubes stored at -80°C |
| Pathogens | Influenza A virus and *Aspergillus fumigatus* stock | Reuse data | Physical | / | / | / | Tubes stored at -80°C |
| Statistical analysis | Data analysed in statistics software and graphs (GraphPad Prism or excel) | Generate new data | Digital | Numerical, Textual | .pzfx<br>.xlsx | < 100 GB | |

*GUIDANCE:*
*The data description forms the basis of your entire DMP, so make sure it is detailed and complete. It includes digital and physical data and encompasses the whole spectrum ranging from raw data to processed and analysed data including analysis scripts and code. Physical data are all materials that need proper management because they are valuable, difficult to replace and/or ethical issues are associated. Materials that are not considered data in an RDM context include your own manuscripts, theses and presentations; documentation is an integral part of your datasets and should described under documentation/metadata.*
*RDM Guidance on data*

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| 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. | No data will be reused except for the previously acquired pathogens in stock and previously optimized protocols used in this project. |

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| Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number. | ☐ Yes, human subject data; provide SMEC or EC approval number:<br>☒ Yes, animal data; provide ECD reference number: P013/2023<br>☐ Yes, dual use; provide approval number:<br>☐ No<br>Additional information: |
| Will you process personal data[4]? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number). | ☐ Yes (provide PRET G-number or EC S-number below)<br>☒ No<br>Additional information: |
| Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)?<br>If so, please comment per dataset or data type where appropriate. | ☐ Yes<br>☒ No<br>If yes, please comment: |
| Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements, research collaboration agreements)?<br>If so, please explain to what data they relate and what restrictions are in place. | ☐ Yes<br>☒ No<br>If yes, please explain: |
| Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use?<br>If so, please explain to what data they relate and which restrictions will be asserted. | ☐ Yes<br>☒ No<br>If yes, please explain: |

[4] See Glossary Flemish Standard Data Management Plan

| 3. Documentation and Metadata | |
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| Clearly 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).<br><br>*RDM guidance on documentation and metadata*. | Transparent data management and proper logging is applied. We will provide the following structure for the documentation: For each experiment a separate folder is made with the name of the experiment. Each experiment folder contains subfolders with planning, protocols, experimental notes and data-analyses.<br>• The planning folder contains a Word file with a brief description of the goal of the experiment, the experimental planning & design (scanning time points, sacrifice, …), the different groups with the number of mice per group.<br>• The protocol folder contains different detailed protocols which will be used for the experiment and which can be used by other researchers to repeat the experiment (Word, Excel, PowerPoint).<br>• The experimental notes consist out of Word files for body weight, clinical scores, … which will be filled in on paper and achieved in a map for different experiments and later stored in excel files.<br>• Data-analyses folder consists out of steps involved in data analysis and all data analysis files (statistics, figures, …) used for analyzing raw data of the experiment (Excel, GraphPad prism xml, Word, PowerPoint, = specific file format according to data type).<br><br>Raw data is stored on network drives with the same experimental name (specific file format according to data type). With the help of these documentations every researcher will be able to look up all the information of the performed experiments and to repeat the experiment in the same way.<br><br>Protocols are written on paper (lab book) or made digital in MS office files (Word and Excel files) as described above. |

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| Will a metadata standard be used to make it easier to **find and reuse the data**?<br><br>If so, please specify which metadata standard will be used. If not, please specify which metadata will be created to make the data easier to find and reuse.<br><br>*REPOSITORIES COULD ASK TO DELIVER METADATA IN A CERTAIN FORMAT, WITH SPECIFIED ONTOLOGIES AND VOCABULARIES, I.E. STANDARD LISTS WITH UNIQUE IDENTIFIERS.* | ☐ Yes<br>☒ No<br>If yes, please specify (where appropriate per dataset or data type) which metadata standard will be used:<br><br>If no, please specify (where appropriate per dataset or data type) which metadata will be created:<br>A metadata standard will not be used. However, metadata will be created and maintained to support understanding and reuse of the data. For fluorescence microscopy images, accompanying .txt files for each image will provide relevant metadata such as acquisition settings, imaging channels, resolution, and sample details. For micro-CT scans, each dataset will include a log file detailing scan parameters and reconstruction settings. Additional metadata will be compiled in README files to describe the structure of the datasets, file naming conventions, and any processing steps applied. |

| 4. Data Storage & Back-up during the Research Project | |
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| Where will the data be stored?<br><br>*Consult the interactive KU Leuven storage guide to find the most suitable storage solution for your data.* | ☐ Shared network drive (J-drive)<br>☒ Personal network drive (I-drive)<br>☒ OneDrive (KU Leuven)<br>☐ Sharepoint online<br>☐ Sharepoint on-premis<br>☒ Large Volume Storage<br>☐ Digital Vault<br>☒ Other:<br><br>Acquired data is stored on protected data servers with a foreseen storage for 10 years (for raw) and unlimited storage capacity managed by KULeuven ICT (MoSAIC/GBioMed). Network drive read and/or write access is strictly regulated, thereby creating a restricted environment. In addition, we are beginning to implement the use of ManGO, an active data management platform that supports structured project-based data organization, metadata integration, and easier collaboration. Once integrated, the goal is to transition to ManGO as the primary platform for managing active datasets and associated metadata. Physical data will be stored for five years after publication and if necessary longer for future research. Copies are made and kept on personal devices and external storage device. Biological samples, Influenza and fungal strains are stored – depending on the type of sample – at room temperature in a stock room, in a fridge at 4°C or in a -80°C freezer. |
| How will the data be backed up?<br><br>*WHAT STORAGE AND BACKUP PROCEDURES WILL BE IN PLACE TO PREVENT DATA LOSS?* | ☒ Standard back-up provided by KU Leuven ICTS for my storage solution<br>☒ Personal back-ups I make (specify)<br>☐ Other (specify)<br><br>Raw imaging data: acquired data on protected data servers automatically backed up (mirrored) managed by KULeuven ICT (GBioMed). As we transition to using ManGO, backups will be integrated into its storage infrastructure to maintain consistent data protection. Non-raw data (manuscripts, data-analysis, …) is backup-ed on external hard drives and protected data servers. |

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| Is there currently sufficient storage & 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<br>☐ No<br><br>If no, please specify: |
| How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?<br><br>*CLEARLY DESCRIBE THE MEASURES (IN TERMS OF PHYSICAL SECURITY, NETWORK SECURITY, AND SECURITY OF COMPUTER SYSTEMS AND FILES) THAT WILL BE TAKEN TO ENSURE THAT STORED AND TRANSFERRED DATA ARE SAFE.*<br>*Guidance on security for research data* | All notes are present in the labs, secured by badge-controlled access to building, building sections and locked rooms. All computers are password secured, managed by KU Leuven ICT. Network drives are strictly regulated thereby creating restricted environment to read and/or write access to data [u-number and password controlled]. |
| What are the expected costs for data storage and backup during the research project? How will these costs be covered? | Costs for data server storage (113.84 euro / Tb according to cost model KU Leuven ICT), external HD, … are taken into account in the projects' budget proposal and are covered by bench fee supplemented with additional project funding acquired by the PIs. Sample storage (such as in cold room, freezer, sample storages boxes …) are covered by project funding and overhead. |

## 5. Data Preservation after the end of the Research Project

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| Which data will be retained for at least five 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...).<br><br>*Guidance on data preservation* | ☒ All data will be preserved for 10 years according to KU Leuven RDM policy<br>☐ All data will be preserved for 25 years according to CTC recommendations for clinical trials with medicinal products for human use and for clinical experiments on humans<br>☐ Certain data cannot be kept for 10 years (explain) |
| Where will these data be archived (stored and curated for the long-term)?<br><br>*Dedicated data repositories are often the best place to preserve your data. Data not suitable for preservation in a repository can be stored using a KU Leuven storage solution, consult the interactive KU Leuven storage guide.* | ☐ KU Leuven RDR<br>☒ Large Volume Storage (longterm for large volumes)<br>☐ Shared network drive (J-drive)<br>☐ Other (specifiy):<br><br>Acquired data will be automatically stored on protected data servers with a foreseen storage for 10 years (for raw) and unlimited storage capacity managed by KU Leuven ICT (MoSAIC/GBioMed). Physical data will be stored for 5 years after publication and if necessary longer for future research studies on the subject. |
| What are the expected costs for data preservation during the expected retention period? How will these costs be covered? | Costs for data server storage/preservation (113.84 euro / Tb according to cost model KU Leuven ICT), external HD, … are taken into account in the projects' budget proposal and are covered by bench fee supplemented with additional project funding acquired by the PIs. Sample storage/preservation (such as in cold room, freezer, sample storages boxes …) are covered by project funding and overhead project fund. |

## 6. Data Sharing and Reuse

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| Will the data (or part of the data) be made available for reuse after/during the project? Please explain per dataset or data type which data will be made available.<br><br>*NOTE THAT 'AVAILABLE' DOES NOT NECESSARILY MEAN THAT THE DATA SET BECOMES OPENLY AVAILABLE, CONDITIONS FOR ACCESS AND USE MAY APPLY. AVAILABILITY IN THIS QUESTION THUS ENTAILS BOTH OPEN & RESTRICTED ACCESS. FOR MORE INFORMATION: HTTPS://WIKI.SURFNET.NL/DISPLAY/STANDARDS/INFO-EU-REPO/#INFOEUREPO-ACCESSRIGHTS* | ☒ Yes, as open data<br>☐ Yes, as embargoed data (temporary restriction)<br>☐ Yes, as restricted data (upon approval, or institutional access only)<br>☐ No (closed access)<br>☐ Other, please specify:<br><br>Relevant findings will be disseminated through publications in peer reviewed international journals. All articles will be published Open Access under Creative Commons licenses (CC BY 4.0). Data will be presented on (inter)national scientific field specific meetings. All (original) data will be made available upon reasonable request with the PI. |
| If access is restricted, please specify who will be able to access the data and under what conditions. | / |
| Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)? Please explain per dataset or data type where appropriate. | ☐ Yes, privacy aspects<br>☐ Yes, intellectual property rights<br>☐ Yes, ethical aspects<br>☐ Yes, aspects of dual use<br>☐ Yes, other<br>☒ No<br><br>If yes, please specify: |
| Where will the data be made available?<br>If already known, please provide a repository per dataset or data type. | ☐ KU Leuven RDR<br>☐ Other data repository (specify)<br>☒ Other (specify)<br><br>Upon reasonable request with the PI and in an Open Access repository. |

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| When will the data be made available? | ☒ Upon publication of research results<br>☐ Specific date (specify)<br>☐ Other (specify) |
| Which data usage licenses are you going to provide? If none, please explain why.<br><br>*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.*<br>*Check the RDR guidance on licences for data and software sources code or consult the License selector tool to help you choose.* | ☒ CC-BY 4.0 (data)<br>☐ Data Transfer Agreement (restricted data)<br>☐ MIT licence (code)<br>☐ GNU GPL-3.0 (code)<br>☐ Other (specify) |
| Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, please provide it here.<br><br>*INDICATE WHETHER YOU INTEND TO ADD A PERSISTENT AND UNIQUE IDENTIFIER IN ORDER TO IDENTIFY AND RETRIEVE THE DATA.* | ☒ Yes, a PID will be added upon deposit in a data repository<br>☐ My dataset already has a PID<br>☐ No |
| What are the expected costs for data sharing? How will these costs be covered? | Costs for data sharing are taken into account in the projects' budget proposal and are covered by bench fee supplemented with additional project funding acquired by the PIs.<br>Costs will be considered ad hoc with the requester depending on the requested data/sample format / amount. |

## 7. Responsibilities

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| Who will manage data documentation and metadata during the research project? | Lauren Michiels, Prof. Greetje Vande Velde (corresponding supervisor), Prof. Pedro Elias Marques |
| Who will manage data storage and backup during the research project? | Lauren Michiels, Prof. Greetje Vande Velde (corresponding supervisor), Prof. Pedro Elias Marques |
| Who will manage data preservation and sharing? | Lauren Michiels, Prof. Greetje Vande Velde (corresponding supervisor), Prof. Pedro Elias Marques |
| Who will update and implement this DMP? | Lauren Michiels, Prof. Greetje Vande Velde (corresponding supervisor), Prof. Pedro Elias Marques |