# 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 | |
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| Name Grant Holder & ORCID | **Hans Van Oosterwyck, 0000-0002-2142-9717** |
| Contributor name(s) (+ ORCID) & roles | |
| Project number [1] & title | PRECLINICAL STUDY TARGETING MECHANOSENSITIVE CA2+ CHANNELS FOR CEREBRAL CAVERNOUS MALFORMATIONS THERAPY AND EARLY DIAGNOSIS |
| Funder(s) GrantID [2] | G0L1522N |
| Affiliation(s) | X KU Leuven<br>☐ Universiteit Antwerpen<br>☐ Universiteit Gent<br>☐ Universiteit Hasselt<br>☐ Vrije Universiteit Brussel<br>☐ Other:<br>ROR identifier KU Leuven: 05f950310 |

[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.

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| Please provide a short project description | Cerebral Cavernous Malformations (CCM), a cerebrovascular disease affecting small vessels in 1 out of 200 individuals, are stacks of dilated and haemorrhagic venous capillaries formed by a unique layer of poorly joined endothelial cells. Incompetent blood-brain barrier (BBB) is a major manifestation of CCM leading to headaches, seizures, paralysis, sensory or cognitive deficits. Currently, surgical resection is not always possible and there is no therapeutic alternative. MECACCM will explore molecular events at the onset of CCM and innovative therapeutic strategies. Mysteriously, CCM lesions form only in low flow venous capillaries but not in high flow vessels. Preliminary results from our consortium advocate for a causative role of mechanosensitive calcium channels of the Piezo and TRPV families. Their contributions to CCM onset has however never been explored. This project brings together recognized experts in endothelial mechanotransduction, cell and matrix mechanics and miRNA signalling to investigate the interplay between cell-generated forces, intrinsic molecular pathways and extrinsic mechanical cues. By combining *in vitro* data with the analysis of patient CCM samples collected in the largest German biobank, the goal of this project is to identify early biomarkers of CCM initiation and to perform preclinical testing of nanoparticles loaded with drugs targeting mechanosensitive calcium channels in *in vivo* CCM mouse models thanks to experts in nanomedicine and functional neuroimaging of the BBB. |

## 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 |
| (Traction force) microscopy related data | Confocal microscopy raw data and its processing (and related data) to infer cellular tractions | ☒ 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: | microscopy image data sets (digital, .lif files), computational codes (digital, .m files), processed image datasets (digital, .pvd files), hydrogel mechanical test results (digital, .xls, .csv files) | ☐ < 1 GB<br>☐ < 100 GB<br>☐ < 1 TB<br>☒ < 5 TB<br>☐ > 5 TB<br>☐ NA<br><br>2-5 GB/ combined dataset, around **2 TB** data expected over the project duration | |
| In vitro device-related data | In vitro chambers (and their design) to perform in vitro experiments | ☒ 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: | CAD designs of devices (in vitro chambers) (digital, SolidEdge .par, .asm, and .stl, .step files), computational flow models (digital, .mph files), | ☐ < 1 GB<br>☒ < 100 GB<br>☐ < 1 TB<br>☐ < 5 TB<br>☐ > 5 TB<br>☐ NA<br><br>total expected digital data volume around **10 GB** | In vitro (flow) chambers and peristaltic pumps |

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| Cell biology related data | Cells and samples stored for experiments as well their microscopy images | ☒ 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: | Microscope images and analysis thereof (.czi, .tiff, .xls, .csv, .zvi, .jpg) | ☐ < 1 GB<br>☐ < 100 GB<br>☒ < 1 TB<br>☐ < 5 TB<br>☐ > 5 TB<br>☐ NA | commercially available human primary endothelial cells (vials), genetically modified endothelial cells (vials), histological samples (immunohistochemistry) |
| electronic lab note books, experimental protocols, experimental conditions and other metadata | | ☒ 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: | Word, pdf | ☒ < 1 GB<br>☐ < 100 GB<br>☐ < 1 TB<br>☐ < 5 TB<br>☐ > 5 TB<br>☐ NA | |

*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*

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

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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. | NA |
| 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: S54744<br>☐ Yes, animal data; provide ECD reference number:<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: |

[4] See Glossary Flemish Standard Data Management Plan

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| 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: |

| 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*. | The main results and methods will be published in peer-reviewed journals.<br>All generated data and metadata (experimental conditions, protocols used, reagents used, cells used) will be archived digitally. All groups have templates for writing protocols, and templates for excel spreadsheets for raw data and data analysis. When we upload raw data to repositories, we will affix keywords and a readme file with the needed information for reuse. KU Leuven's private Gitlab repository will be used for version control and ease of sharing of computational codes (made available at https://gitlab.kuleuven.be/MAtrix). |
| 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><br>The metadata will be a combination of machine generated metadata (e.g. imaging conditions stored by the microscope software), standard operation procedures (SOP's), and lab journal records detailing all other relevant experimental details. The metadata will be included as keywords and all information about the data into readme files inserted with each dataset. |

| 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>All data other than the large volume data sets (microscopy images, processed images) will be stored locally on the researcher's computer, while being constantly synced to KU Leuven OneDrive. Large volume data sets will be stored in the KU Leuven Large Volume Storage drive (L: drive). |
| 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>The researcher's computers will be permanently synced using KU Leuven OneDrive (cloud service available per KU Leuven researcher) and the data on the network drives is kept secure and backed up by the university ICTS services. When a dataset will no longer be modified (e.g. after publication of manuscripts), archiving to a read only network drive (KU Leuven K: drive) will be done to maintain a copy. |

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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>Each researcher will have cloud storage space using KU Leuven OneDrive, covering all requirements other than the large volume datasets. The large volume datasets (primarily microscopy images, both raw and processed) will amount to an estimated total of **2 TB** over the project duration. This data will be partially stored on the KU Leuven K: drive and L: drive during the course of the project and archived on the KU Leuven K: drive after the end of the project. The microscopes are directly connected to the KU Leuven Network L: drive, facilitating this storage. |
| 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* | Storage on university network drives are secure data storage solutions with security services managed by the University ICTS department. They provide the options to control data access by authorised persons and maintain backups in secure physical locations. The above-mentioned storage sites are compatible with GDPR regulations |
| What are the expected costs for data storage and backup during the research project? How will these costs be covered? | Storage space on the KU Leuven drives will be acquired based on project needs. This cost is estimated at 4000 € (for entire project duration) and will be covered from the project consumables budget. |

## 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)<br><br>All digital data and metadata will be retained for at least 10 years. Where possible and deemed useful, aliquots of cells used and their genetically modified versions will be kept stored under cryopreservation |
| 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): |
| What are the expected costs for data preservation during the expected retention period? How will these costs be covered? | Costs are estimated to be of the order of 3000 euros for the 10 year period. It remains to be decided how we will cover these costs. |

## 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>The main findings of the research with all supporting processed data will be made available via publications in peer-reviewed journals. Publishing all raw data associated with published manuscripts on data repositories will be considered (to be decided). |
| 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>To be decided for data repositories. A Gitlab repository will be used for sharing computational codes. |

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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)<br><br>To be decided |
| 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? | No costs for digital data sharing are foreseen. |

| **7. Responsibilities** | |
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| Who will manage data documentation and metadata during the research project? | The researchers will be responsible for data documentation and metadata. |

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| Who will manage data storage and backup during the research project? | The researchers will be responsible for data storage and backup. |
| Who will manage data preservation and sharing? | The researchers and the supervisor will jointly manage data preservation and sharing. |
| Who will update and implement this DMP? | The supervisor (prof. Hans Van Oosterwyck) |