FWO DMP Template - Flemish Standard Data Management Plan

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	**Kaat Van Assche (0000-0002-9552-4629)**
Contributor name(s) (+ ORCID) & roles	**PI (supervisor): Prof. Emmanuel Vander Poorten (0000-0003-3764-9551)**
Project number[1] & title	UNISON - ultrasound-guided multi-robotic interventions involving bony structures
Funder(s) GrantID[2]	1SHGA24N
Affiliation(s)	☑ KU Leuven ☐ Universiteit Antwerpen ☐ Universiteit Gent ☐ Universiteit Hasselt ☐ Vrije Universiteit Brussel ☐ Other: Provide ROR[3] identifier when possible:
Please provide a short project description	**UNISON** will establish a breakthrough in intraoperative navigation by developing **a dedicated US-based multi-robotic** system for PSP and catheter navigation inside the heart. UNISON's synergistic system will accurately track and **navigate instruments close to bony structures based on dedicated path planning algorithms for 3D reconstructions**. By pushing US-based navigation, UNISON will improve patient quality of life, increase surgical accuracy and limit radiation exposure.

[1] "Project number" refers to the institutional project number. This question is optional since not every institution has an internal project number different from the GrantID. 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.

[3] Research Organization Registry Community. https://ror.org/

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[4].

				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
CT data (WP1)	Ground truth data from cadavers/human volunteers/animals spines	☒ Generate new data ☐ Reuse existing data	☒ Digital ☐ Physical	☒ Experimental	☒ other: .DICOM	☒ < 1 TB	
Ultrasound data (WP1)	Raw US images	☒ Generate new data	☒ Digital	☒ Experimental	☒ .png	☒ < 1 TB	
Ultrasound segmentation (WP2,3)	Segmented and labelled US data	☒ Generate new data	☒ Digital	☒ Compiled/ aggregated data	☒ .stl ☒ .png	☒ < 100 GB	
Validation Robot data (WP2, WP3)	Force and robot data of robotic US scan	☒ Generate new data	☒ Digital	☒ Experimental	☒ .csv	☒ < 1 GB	
Path planning models (WP2)	Python code and robot code (lua files)	☒ Generate new data	☒ Digital	☒ Software	☒ .py ☒ .lua	☒ < 1 GB	
Multi robot models (WP3)	Python code and robot code (lua files)	☒ Generate new data	☒ Digital	☒ Software	☒ .py ☒ .lua	☒ < 1 GB	
Qualitative validation of experiments	Feedback from surgeons	☒ Generate new data	☒ Digital	☒ Observational	☒ .txt ☒ .doc	☒ < 100 MB	

Videos and photos of experiments	Videos of the experiment	☒ Generate new data	☒ Digital	☒ Experimental	☒ .mov ☒ .png	☒ < 1 GB	
All WP's Metadata	Metadata	☒ Generate new data	☒ Digital	☒ Compiled/ aggregated data	☒ .txt	☒ < 100 MB	
All WP's Writing	Reports and publications	☒ Generate new data	☒ Digital	☒ Publications	☒ .pdf	☒ < 100 MB	

GUIDANCE:

DATA CAN BE DIGITAL OR PHYSICAL (FOR EXAMPLE BIOBANK, BIOLOGICAL SAMPLES, …). DATA TYPE: DATA ARE OFTEN GROUPED BY TYPE (OBSERVATIONAL, EXPERIMENTAL ETC.), FORMAT AND/OR COLLECTION/GENERATION METHOD.

EXAMPLES OF DATA TYPES: OBSERVATIONAL (E.G. SURVEY RESULTS, SENSOR READINGS, SENSORY OBSERVATIONS); EXPERIMENTAL (E.G. MICROSCOPY, SPECTROSCOPY, CHROMATOGRAMS, GENE SEQUENCES); COMPILED/AGGREGATED DATA[5] (E.G. TEXT & DATA MINING, DERIVED VARIABLES, 3D MODELLING); SIMULATION DATA (E.G. CLIMATE MODELS); SOFTWARE, ETC.

EXAMPLES OF DATA FORMATS: TABULAR DATA (.POR,. SPSS, STRUCTURED TEXT OR MARK-UP FILE XML, .TAB, .CSV), TEXTUAL DATA (.RTF, .XML, .TXT), GEOSPATIAL DATA (.DWG,. GML, ..), IMAGE DATA, AUDIO DATA, VIDEO DATA, DOCUMENTATION & COMPUTATIONAL SCRIPT.

DIGITAL DATA VOLUME: PLEASE ESTIMATE THE UPPER LIMIT OF THE VOLUME OF THE DATA PER DATASET OR DATA TYPE.

PHYSICAL VOLUME: PLEASE ESTIMATE THE PHYSICAL VOLUME OF THE RESEARCH MATERIALS (FOR EXAMPLE THE NUMBER OF RELEVANT BIOLOGICAL SAMPLES THAT NEED TO BE STORED AND PRESERVED DURING THE PROJECT AND/OR AFTER).

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.	**If data will be reused (e.g. online CT dataset), the DOI will be recorded.**

[4] Add rows for each dataset you want to describe.
[5] These data are generated by combining multiple existing datasets.

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, please describe these issues further and refer to specific datasets or data types when appropriate.	☒ Yes, human subject data ☒ Yes, animal data ☐ Yes, dual use ☐ No If yes, please describe: **Experiments will be conducted on humans and animals. All data will be anonymized, and the appropriate ethical approval will be requested for the experiments.**
Will you process personal data[6]? If so, briefly describe the kind of personal data you will use. Please refer to specific datasets or data types when appropriate. If available, add the reference to your file in your host institution's privacy register.	☐ Yes ☒ No If yes: - Short description of the kind of personal data that will be used: - Privacy Registry Reference:
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 If yes, please comment: **The path planning and US navigation platform have the potential for valorisation. Possibly some parts of the applied software will be licensed under a commercial license, to allow valorisation. The currently used software has a permissive license, allowing the use in commercial software and built on top of it.**

[6] See Glossary Flemish Standard Data Management Plan

Do existing 3rd 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 to what data they relate and what restrictions are in place.	☐ Yes ☒ No 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? If so, please explain to what data they relate and which restrictions will be asserted.	☐ Yes ☒ No If yes, please explain:

3. Documentation and Metadata	
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).	**A global metadata file (Excel sheet) will be provided that contains a list of all the code versions names, validation experiments with corresponding date, type of data and in which folder to find that data. Metadata will be provided for experimental data in the form of txt-files. The file will contain all information on date of experiment, parameters used, experiment protocol (workflow) and how to process the data or use/display/interpret the results. The code to validate this data will also be added. The clinical data (e.g. CTs) will be clearly described in an Excel file and all processed data and corresponding reconstructions will be named in the same file. The parameters will also be added.**

Will a metadata standard be used to make it easier to **find and reuse the data**? 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. *REPOSITORIES COULD ASK TO DELIVER METADATA IN A CERTAIN FORMAT, WITH SPECIFIED ONTOLOGIES AND VOCABULARIES, I.E. STANDARD LISTS WITH UNIQUE IDENTIFIERS.*	☐ Yes ☒ No If yes, please specify (where appropriate per dataset or data type) which metadata standard will be used: If no, please specify (where appropriate per dataset or data type) which metadata will be created: **Folder organization: the folders will have a hierarchical structure with general superfolders dividing different categories (Workspace, Ultrasound Segmentation, Robot control, etc.). Each superfolder will contain several levels of subfolders with logical names, each level becoming more specific up to the single experiment level. Folder names will be clear and descriptive. The most specific level will have a folder name containing: experiment name (or acronym) corresponding to the name in the global metadata file, date, type of data, researcher name (or initials).** **In each experiment folder, a ReadMe file will be provided that specifies the experiment methodology, used equipment and how to process the data or use/display/interpret the results. All code will contain sufficient commentary for ease of use by non-authors.**

4. Data Storage & Back-up during the Research Project	
Where will the data be stored?	**KUL Onedrive and copy on personal KUL hard drive. Code will also be stored on Github.** **Large datasets could be stored on the KUL L drive.**

How will the data be backed up? *WHAT STORAGE AND BACKUP PROCEDURES WILL BE IN PLACE TO PREVENT DATA LOSS? DESCRIBE THE LOCATIONS, STORAGE MEDIA AND PROCEDURES THAT WILL BE USED FOR STORING AND BACKING UP DIGITAL AND NON-DIGITAL DATA DURING RESEARCH.*[7] *REFER TO INSTITUTION-SPECIFIC POLICIES REGARDING BACKUP PROCEDURES WHEN APPROPRIATE.*	**The general ICT back-up policy that KUL uses for Onedrive is applied.**
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 ☐ No If yes, please specify concisely: **One Drive provides 2TB safe cloud drive for KU Leuven staff, which is sufficient for all data storage.** **The KUL L drive has more storage for larger data sets, and a KUL hard drive of 2TB will also be used.** If no, please specify:
How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons? *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.* [7]	**Access to the shared drive is only granted to authorized researchers from the research group. GitHub access is also only granted to the appropriate contributors.**
What are the expected costs for data storage and backup during the research project? How will these costs be covered?	**2TB One Drive storage provided by KU Leuven (with a free extension possibility of up to 5TB) is sufficient for all data storage. No cost for data storage is foreseen.**

[7] Source: Ghent University Generic DMP Evaluation Rubric: https://osf.io/2z5g3/

5. Data Preservation after the end of the Research Project	
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...).	**All research data will be stored in storage facilities of the research unit and will be kept for minimally 5 years post finalization of the project. All data will be anonymized before storage (and will be obtained/used only after approval of the corresponding ethical committees).** **Relevant quantitative research data will be generated during the project. This includes data crucial for verification and reproduction of research results, data that is obtained at great time cost, and data of scientific value. Naturally, any restrictions related to personal data (e.g., informed consent or insufficient anonymization) will be taken into account to determine the preservation.**
Where will these data be archived (stored and curated for the long-term)?	**All research data will be stored in storage facilities of the research unit or on KU Leuven's servers and behind proper authentication.**
What are the expected costs for data preservation during the expected retention period? How will these costs be covered?	**A large amount of raw and derived data will be stored for the long-term evaluation. Therefore, adequate resources will be allocated in the research expenses budget (estimated 120EUR/ TB each year)**

6. Data Sharing and Reuse	
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. *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, in an Open Access repository ☒ Yes, in a restricted access repository (after approval, institutional access only, …) ☐ No (closed access) ☐ Other, please specify:
If access is restricted, please specify who will be able to access the data and under what conditions.	**The PI can access the data for research purposes.**
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 ☐ Yes, intellectual property rights ☒ Yes, ethical aspects ☐ Yes, aspects of dual use ☐ Yes, other ☐ No If yes, please specify: **The human and animal data (e.g. CTs) can only be shared with those mentioned in the ethical approval, if not published. Published data sets will become available.**
Where will the data be made available? If already known, please provide a repository per dataset or data type.	**Data can be shared using KUL RDR.**

When will the data be made available? *THIS COULD BE A SPECIFIC DATE (DD/MM/YYYY) OR AN INDICATION SUCH AS 'UPON PUBLICATION OF RESEARCH RESULTS'.*	**Upon publication of the research results.**
Which data usage licenses are you going to provide? If none, please explain why. *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.* *EXAMPLE ANSWER: E.G. "DATA FROM THE PROJECT THAT CAN BE SHARED WILL BE MADE AVAILABLE UNDER A CREATIVE COMMONS ATTRIBUTION LICENSE (CC-BY 4.0), SO THAT USERS HAVE TO GIVE CREDIT TO THE ORIGINAL DATA CREATORS."* [8]	**Data from the project that can be shared will be made available under a Creative Commons Attribution license (CC-BY 4.0), so that users have to give credit to the original data creators.**
Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, please provide it here. *INDICATE WHETHER YOU INTEND TO ADD A PERSISTENT AND UNIQUE IDENTIFIER IN ORDER TO IDENTIFY AND RETRIEVE THE DATA.*	☒ Yes ☐ No If yes: **If sufficient useful data can be shared in a public database, a DOI will be made on RDR.**
What are the expected costs for data sharing? How will these costs be covered?	**Data can be shared for free using KUL RDR.**

[8] Source: Ghent University Generic DMP Evaluation Rubric: https://osf.io/2z5g3/

7. Responsibilities	
Who will manage data documentation and metadata during the research project?	**The Ph.D. researcher is responsible for the data management during the project but consults with Dr. Mouloud Ourak, data-manager of the Robot-Assisted Surgery group. After completion of the Ph.D., supervisor Emmanuel Vander Poorten will take over this responsibility.**
Who will manage data storage and backup during the research project?	**The Ph.D. researcher is responsible for the data management during the project.**
Who will manage data preservation and sharing?	**Dr. Mouloud Ourak, data-manager of the Robot-Assisted Surgery group.**
Who will update and implement this DMP?	**The PI bears the overall responsibility for updating & implementing this DMP.**