

1. General Project Information

Name Grant Holder & ORCID	Maarten Schoovaerts (0000-0001-7293-285X)
Contributor name(s) (+ ORCID) & roles	Nicolas Verhaert (0000-0002-3512-1334), Promotor Gianni Borghesan (0000-0002-6023-1498), Co-Promotor Mouloud Ourak (0000-0003-4885-8965), Co-Promotor
Project number ¹ & title	CHARIOT – High precision cochlear probe insertion robot
Funder(s) GrantID ²	1SG1623N
Affiliation(s)	<input checked="" type="checkbox"/> KU Leuven <input type="checkbox"/> Universiteit Antwerpen <input type="checkbox"/> Universiteit Gent <input type="checkbox"/> Universiteit Hasselt <input type="checkbox"/> Vrije Universiteit Brussel <input type="checkbox"/> Other: Provide ROR ³ identifier when possible:
Please provide a short project description	During this project, a robotic device for cochlear insertion is developed. The robotic device is based on optical coherence tomography probes and concentric tube robotics. This enables the device to steer inside and map the cochlea by means of a 3D reconstruction, in addition to enabling diagnostics of the cochlear micro structures. Next to the mechanical design of robotized platform and miniaturized probes, development of system control & 3D reconstruction software is developed. Finally the efficacy system is tested by means of in vitro experiments.

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 data⁴.

Dataset Name	Description	New or Reused	Digital or Physical	ONLY FOR DIGITAL DATA	ONLY FOR DIGITAL DATA	ONLY FOR DIGITAL DATA	ONLY FOR PHYSICAL DATA
				Digital Data Type	Digital Data Format	Digital Data Volume (MB, GB, TB)	Physical Volume
Robotic system design	CAD files & technical drawings of robotic system (developed with Solidworks)	<input checked="" type="checkbox"/> Generate new data <input checked="" type="checkbox"/> Reuse existing data	<input checked="" type="checkbox"/> Digital	<input checked="" type="checkbox"/> Software	<input checked="" type="checkbox"/> .SLDPRT <input checked="" type="checkbox"/> .SLDASM <input checked="" type="checkbox"/> .SLDDRW <input checked="" type="checkbox"/> .STL <input checked="" type="checkbox"/> .STEP <input checked="" type="checkbox"/> .pdf	<input checked="" type="checkbox"/> < 1 TB	
Robotic system modelling	Calculations/ algorithms using python & excel	<input checked="" type="checkbox"/> Generate new data	<input checked="" type="checkbox"/> Digital	<input checked="" type="checkbox"/> Software	<input checked="" type="checkbox"/> .py <input checked="" type="checkbox"/> .xlsx	<input checked="" type="checkbox"/> < 1 GB	
CT-scans	Cochlea & temporal bones, will be from CT scans & segmentation using 3D slicers	<input checked="" type="checkbox"/> Generate new data <input checked="" type="checkbox"/> Reuse existing data	<input checked="" type="checkbox"/> Digital	<input checked="" type="checkbox"/> Software	<input checked="" type="checkbox"/> .STL <input checked="" type="checkbox"/> .dcm <input checked="" type="checkbox"/> .mrml	<input checked="" type="checkbox"/> < 100 GB	
System control	Software for system control	<input checked="" type="checkbox"/> Generate new data	<input checked="" type="checkbox"/> Digital	<input checked="" type="checkbox"/> Software	<input checked="" type="checkbox"/> .py <input checked="" type="checkbox"/> .cpp	<input checked="" type="checkbox"/> < 100 GB	

⁴ Add rows for each dataset you want to describe.

	(including 3D reconstruction) using python, C++ and LabView	<input checked="" type="checkbox"/> Reuse existing data			<input checked="" type="checkbox"/> .vi		
Insertion experiments – OCT	OCT images & 3D reconstruction files	<input checked="" type="checkbox"/> Generate new data	<input checked="" type="checkbox"/> Digital	<input checked="" type="checkbox"/> Experimental	<input checked="" type="checkbox"/> .png <input checked="" type="checkbox"/> .jpg <input checked="" type="checkbox"/> .avi <input checked="" type="checkbox"/> .txt <input checked="" type="checkbox"/> .xyz <input checked="" type="checkbox"/> .bag	<input checked="" type="checkbox"/> < 1 TB	
Insertion experiments – Images	Videos & (microscopic) images of insertion experiments	<input checked="" type="checkbox"/> Generate new data	<input checked="" type="checkbox"/> Digital	<input checked="" type="checkbox"/> Experimental	<input checked="" type="checkbox"/> .png <input checked="" type="checkbox"/> .jpg <input checked="" type="checkbox"/> .avi	<input checked="" type="checkbox"/> < 1 TB	

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 DATA⁵ (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).

⁵ These data are generated by combining multiple existing datasets.

<p>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.</p>	<p>KU Leuven Onedrive / Large volume storage (= J Drive) Robot Assisted Surgery (RAS) group:</p> <ul style="list-style-type: none"> - Robotic system design <p>KU Leuven GitLab RAS group:</p> <ul style="list-style-type: none"> - System control <p>External hard drives stored at the lab + Large volume storage Experimental Oto-, Rhino-, Laryngology Research (ExpORL) group:</p> <ul style="list-style-type: none"> - 3D printed samples
<p>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.</p>	<p><input checked="" type="checkbox"/> Yes, human subject data <input type="checkbox"/> Yes, animal data <input type="checkbox"/> Yes, dual use <input type="checkbox"/> No</p> <p>If yes, please describe: Reference to the formal approval by the ethical review committee for human subject data: S-65502</p>
<p>Will you process personal data⁶? 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.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes:</p> <ul style="list-style-type: none"> - Short description of the kind of personal data that will be used: The data of human temporal samples will maintain anonymous, the only available information will be the gender, age and freezing/thawing time of the samples.
<p>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.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, please comment: The robotic system has potential for valorization. The necessary data-sets for exploitation will be:</p> <ul style="list-style-type: none"> - Robotic system design - Robotic system calculations - System control

⁶ See Glossary Flemish Standard Data Management Plan

<p>Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements, research collaboration agreements)?</p> <p>If so, please explain to what data they relate and what restrictions are in place.</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p> <p>If yes, please explain:</p>
<p>Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use?</p> <p>If so, please explain to what data they relate and which restrictions will be asserted.</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p> <p>If yes, please explain:</p>

3. Documentation and Metadata

<p>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).</p>	<ul style="list-style-type: none"> - Robotic system design will be illustrated by technical drawings & assembly drawings. - All python/c++ files are uploaded to GitLab of the RAS group with a readme file to understand the working principle and on how to use the software. - Calculations for the system will be explained by making use of .pdf and .docs files. All the python files will be stored on the GitLab of the RAS group with a readme file. - Protocols and guidelines for experiments will be available as .pdf and .docs files. Each insertion experiment will also have a file explaining all the details (for example version of robotic system, insertion time, what sample, details on sample,...)
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<p>Will a metadata standard be used to make it easier to find and reuse the data?</p> <p>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.</p> <p><i>REPOSITORIES COULD ASK TO DELIVER METADATA IN A CERTAIN FORMAT, WITH SPECIFIED ONTOLOGIES AND VOCABULARIES, I.E. STANDARD LISTS WITH UNIQUE IDENTIFIERS.</i></p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p>
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4. Data Storage & Back-up during the Research Project	
<p>Where will the data be stored?</p>	<p>The data will be stored on KU Leuven administered drives (large volume storage and OneDrive). In order to be able to easily analyse the data, some files will need (temporarily) to be stored on an external or laptop hard drive.</p>
<p>How will the data be backed up?</p> <p><i>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</i></p> <p><i>REFER TO INSTITUTION-SPECIFIC POLICIES REGARDING BACKUP PROCEDURES WHEN APPROPRIATE.</i></p>	<p>Since the data are stored on KU Leuven storage, the general ICT back-up Policy is applied. Once every month additional backups are made on a physical external hard drive (encrypted).</p>

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

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.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, please specify concisely: Since the data are stored on KU Leuven servers, and these drives are expandable in blocks, the backup capacity is technically not an issue. Storage & backup capacity: OneDrive 2TB - External Hard Drives 1 TB - Laptop Hard drive 0.5 TB
How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons? <i>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</i>	The RAS group & ExpORL group policy is that the researchers have only access to the data from the project they are involved in. Furthermore, the data for long-term storage are kept on large-volume storage drives with limited access (only authorized persons have access).
What are the expected costs for data storage and backup during the research project? How will these costs be covered?	The OneDrive (including version history) has sufficient capacity and is available without any costs. External Hard Drive can be purchased using the bench fee.

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 data, except for the human cadaveric specimens, will be retained the expected 5 year period. After completion of the PhD, co-promotor Mouloud Ourak will take over this responsibility of the data. Due to legal and ethical restrictions, the human cadaveric specimens can only be stored for a limited time (2-3 months) before the specimens will be collected for a funeral with other pieces of the cadaver.
Where will these data be archived (stored and curated for the long-term)?	On KU Leuven administered drives (large volume storage and OneDrive), as this data storage is still accessible by the promotor and co-promoters, if the researcher has left the lab it can be considered long-term storage. The external hard drives which remain in the lab of the RAS group/ExpORL group (secure environment).
What are the expected costs for data preservation during the expected retention period? How will these costs be covered?	None, as OneDrive is not paid by the researcher and the external hard drive will remain property of the relevant group (RAS/ExpORL)

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/#INFOEU-REPO-ACCESSRIGHTS](https://wiki.surfnet.nl/display/standards/info-eu-repo/#INFOEU-REPO-ACCESSRIGHTS)

- ☐ Yes, in an Open Access repository
☒ Yes, in a restricted access repository (after approval, institutional access only, ...)
☐ No (closed access)
☐ Other, please specify:

At this moment, no data will be made available at the end of the project, only upon request and approval of the supervisors

If access is restricted, please specify who will be able to access the data and under what conditions.

PhD and post-docs working under the supervision of Prof. Verhaert, Dr. Ourak or Dr. Borghesan can access the data upon request and approval.

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:

- Depending on the developed technology, it's there is a possibility of patenting, therefore restriction on sharing the data of 'Robotic system design, Robotic system modelling & System control' during the patting phase is restricted.

<p>Where will the data be made available? If already known, please provide a repository per dataset or data type.</p>	<p>Data will be available upon request by email.</p>
<p>When will the data be made available?</p> <p><i>THIS COULD BE A SPECIFIC DATE (DD/MM/YYYY) OR AN INDICATION SUCH AS 'UPON PUBLICATION OF RESEARCH RESULTS'.</i></p>	<p>Data will be available on request after the publication of the research results.</p>
<p>Which data usage licenses are you going to provide? If none, please explain why.</p> <p><i>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.</i></p> <p><i>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</i></p>	<p>Upon acceptance of the study to be published, the cleaned and (pseudo)anonymized data set can be shared under Creative Common Attribution License (CC BY), so that users have to give credit to the original data creators.</p>

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

<p>Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, please provide it here.</p> <p><i>INDICATE WHETHER YOU INTEND TO ADD A PERSISTENT AND UNIQUE IDENTIFIER IN ORDER TO IDENTIFY AND RETRIEVE THE DATA.</i></p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes:</p> <ul style="list-style-type: none"> - DOI will be provided upon acceptance of publishing for the study.
<p>What are the expected costs for data sharing? How will these costs be covered?</p>	<p>No costs expected.</p>

7. Responsibilities

Who will manage data documentation and metadata during the research project?	The researcher, when his contract has ended the responsibility shifts towards Dr. Ourak to ensure data preservation and reuse.
Who will manage data storage and backup during the research project?	The researcher, when his contract has ended the responsibility shifts towards Dr. Ourak to ensure data preservation and reuse.
Who will manage data preservation and sharing?	The researcher, when his contract has ended the responsibility shifts towards Dr. Ourak to ensure data preservation and reuse.
Who will update and implement this DMP?	The researcher bears the end responsibility of updating & implementing this DMP.