

Project LiNaBioFluid

WP5 Data Management Plan (DMP) – Interim Report

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Introduction

LiNaBioFluid “Laser-induced Nanostructures as Biomimetic Model of Fluid Transport in the Integument of Animals” aims on laser-fabrication of biomimetic surfaces with unique wetting properties. These biomimetic surfaces are inspired by the hierarchical micro- and/or nano-structures of the integument of animals.

During the LiNaBioFluid project, partners will employ advanced laser-processing strategies based on self-organization to mimic the specific topography and the excellent wetting properties of the integument of bark bugs and moisture harvesting lizards resulting from adaptations to their environment. The outcome of this innovative biomimetic exploitation of wetting effects is expected to lead to radically new technological advances, including reduction in friction and wear in lubricants.

In order to enhance the impact of the results, LiNaBioFluid partners aim on engaging in activities that will maximize discoverability and the preservation of the knowledge developed during the project. These activities are described in this document and organised per work package in order to concretely describe the contribution of each project partner to the distribution of knowledge and data.

Finally, the D5.9 is a living document foreseen to be updated with information about new dataset generated by the project partners regularly. The final Data Management Plan will be available by the completion of the project on month 36.

1. Overview of the data management in LiNaBioFluid

The goal of LiNaBioFluid Data Management plan is to ensure that knowledge created during project would be accessible years after the end of the project. In order to provide a simple accessibility to data, the project will use the main website of the project (<http://www.laserbiofluid.eu/>) as point of reference regarding where and how to access specific information or datasets resulted from the project. In other words the main website will work as a directory of data storages after the end of the project. After accessing the website users would be able to discover what data has been created during the project and where to seek access for this it. The project will use decentralized access to data for each partner being responsible for long term storage of the data after the end of the project. This structure will provide the required flexibility for handling IPR requested by the partners. Bellow, it is illustrated which datasets have been produced during the project for every partner per work package.

2. Data Management plan for WP1

This workpackage concerns the management of the project, hence it is not expected to have any data issues and property rights from the work in WP1.

3. Data Management plan for WP2

3.1 BAM

BAM will not generate data in WP2 during their work in LiNaBioFluid.

3.2 CSIC

CSIC will not generate data in WP2 during their work in LiNaBioFluid.

3.3 Fraunhofer IPT

Fraunhofer IPT will not generate data in WP2 during their work in LiNaBioFluid

3.4 FORTH

FORTH will not generate data in WP2 during their work in LiNaBioFluid.

3.5 HTC

HTC will not generate data in WP2 during their work in LiNaBioFluid

3.6 JKU and RWTH

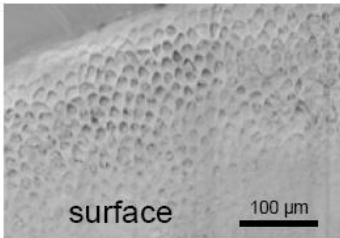
3.6.1 Summary

The micro-structure designs for laser-patterning and laser-structuring of organic materials (at least in WP2) are normally constructed by CAD (computer-aided design) programs and are often available as digital datasets for instance in the STL format. STL (STereoLithography or Standard Triangle Language) is a file format native to the stereolithography CAD software created by 3D Systems. It is widely used for rapid prototyping, 3D printing and computer-aided manufacturing. The partners JKU and RWTH Aachen think that due to strong scientific and industrial competition in the field these datasets should be made available to the public only together with a publication of the results in a scientific journal, for instance as supplement material if the specific journal offers this opportunity. For practical reasons, the size of the supplements should not exceed 10 MB. Due to this limitation, only exemplarily structures with an area below 1 mm² will be shared with the public. However, a scale-up to practical size by multiplication of the structure design seems to be easily feasible for a skilled user.

Overview of datasets that are created in WP2

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
Dataset 2.1: Lizard honeycomb design for realization in organic materials	Task 2.1 Characterization lizard skin Task 2.4 Laser-processing of polymer model	D5.2 Scientific articles and conference contributions
Dataset 2.2: Bark bug design for realization in organic materials	Task 2.2: Characterization bug cuticle Task 2.4 Laser-processing of polymer model Task 2.5: Theoretical modelling	D2.4 Publication of results on bug cuticles D2.6 Publication of results on hydrodynamic modelling D5.2 Scientific articles and conference contributions

3.6.2 Detailed Description of the datasets

Data Set Details	
Dataset name and reference	Dataset 2.1: Lizard honeycomb design for realization in organic materials (no identifier available yet)
Dataset description	<p>The dataset 2.2 describes the hexagonal honeycomb micro-structures which are only found on the outer (i.e. wettable) side of the scales of desert lizards. The main function of hexagon micro-structure is an enhancement of skin wettability by holding a water film on the surface. In wetted state additional droplets immediately spread on the surface. Examples of the structures are shown in the figure at the right.</p> 
Standards and metadata	Honeycomb micro-structures in the same size as in the figure can be generated by a CAD program in form of a STL file. The size of the STL file depends on the total area covered by the micro-structures. If the area is below 1 mm ² , the size of the files is in the order of a few MB. The files can be used for rapid prototyping, 3D printing and computer-aided manufacturing. We have shown this exemplarily by writing polyacrylate honeycomb micro-structures by the method of 2-photon polymerization. This activity was part of milestone MS1 lizard. Scientific articles and conference contributions using these results are planned.

Data sharing	The results of WP2 will be published as articles in scientific journals using the green or gold open access model. Normally the scientific journals offer the possibility to submit additional digital information which can be downloaded via the journal webpage by the readers. As the articles have open access, the download of the supplements is free of charge. We plan to submit the dataset 2.1 with the design of the lizard micro-structures) together with the results on characterization of the lizard skin and on the wetting behaviour of the laser-generated micro-structures on soft organic materials. An in-advance publication of the dataset alone would not be helpful for the typical future user with exception to direct scientific or commercial competitors.
Archiving and preservation (storage and back up)	The download of supplements from the website of scientific journal should be possible as long as the journals exist. As we plan to publish our articles in well renowned high-ranked journals, we see no limitation in future accessibility. The total volume will be in the order of 100 MB. There are no costs foreseeable for submission of the data, except the costs for open access publication. The costs for open access publication are covered by the budget of the LiNaBioFluid project.

Data Set Details	
Dataset name and reference	Dataset 2.2: Bark bug design for realization in organic materials (no identifier available yet)
Dataset description	The dataset 2.2 describes micro-structures on the cuticle of flat bark bugs. They are responsible for the fluid transport on the cuticle. Scientific articles and conference contributions using these results are planned. The dataset 2.2 will also form the base for hydrodynamic modelling of the water transport. The results of this modelling will be published separately.
Standards and metadata	The structures are investigated using standardized methods such as SEM imaging. Micro-structures in the same size as on the bark cuticle will be generated by a CAD program in form of a STL file. Again, the size of the STL file depends on the total area covered by the micro-structures. If the area is below 1 mm ² , the size of the files is in the order of a few MB. The files can be used for rapid prototyping, 3D printing and computer-aided manufacturing. Scientific articles and conference contributions using these results are planned. The dataset 2.2 will form also the base for hydrodynamic modelling of the water transport. The results of this modelling will be published separately.
Data sharing	The plan is to submit the dataset 2.2 with the design of the bark bug micro-structures together with the results on characterization of the bark bug cuticle and the wetting behaviour of the laser-generated micro-structures on soft organic materials. Again an in advance publication of the dataset alone would not be helpful for the typical future user with exception to direct scientific or commercial competitors.
Archiving and preservation (storage and back up)	The download of supplements from the website of scientific journal should be possible as long as the journals exist. As we plan to publish our articles in well renowned high-ranked journals, we see no limitation in the future accessibility. The total volume will be in the order of 100 MB. There are no costs foreseeable for submission of the data, except the costs for open access publication. The costs for open access publication are covered by the budget of the LiNaBioFluid project.

4. Data Management plan for WP3

4.1 BAM

4.1.1 Summary

The work of BAM in WP3 focuses on self-organized laser-induced structure formation (microcones, ripples) on hard inorganic materials like, silicon, steel, and titanium alloys. It includes the tasks 3.1 Laser-based mimicking of lizard structures, 3.2 Laser-based mimicking of bug structures, 3.3 Characterization of friction/wear, and 3.4 Complementary modelling of ultrafast laser-induced periodic surface structures. The data collected at BAM will include scanning electron and optical micrographs (tasks 3.1 and 3.2), data from tribological measurements (task 3.3), data from theoretical modelling of laser-induced surface structures (3.4). BAM will produce periodically summaries of its research activity in form of pdf files as a universal format containing all project-relevant data. The file name will be structured as follows: LNBF-WP3-BAM-summary-date.pdf

Overview of datasets that are created in WP3

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
LNBF-WP3-BAM-summary-date.pdf	Tasks 3.1, 3.2, 3.3, 3.4	D3.1, D3.2, D3.3, D3.4, D3.5, D3.6

4.1.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	LNBF-WP3-BAM-summary-date.pdf
Data set description	The first page of the periodic summary will describe the type of data collected, where it was collected, and conditions under which it was collected.
Standards and metadata	The collected data will include scanning electron and optical micrographs, data from tribological measurements, and data from theoretical modelling of laser-induced surface structures. The last page of the periodic summary will contain conclusions and comments on whether it underpins a scientific publication or results from other partners and gives information on the existence (or not) of similar data and the possibilities for integration and reuse and to whom it could be useful.
Data sharing	Data will be shared (after contact to BAM) only internally with other partners in order to prevent competitors to benefit from the project before the partners can benefit. In the cases when the dataset contains intellectual property relevant data it will not be shared.
Archiving and preservation (storage and back up)	The repository where the data will be stored is at the BAM group on a hard drive on a server that is backed-up automatically and regularly by the BAM IT department, as well as on the internal part of the LiNaBioFluid website. The LiNaBioFluid data shall be preserved for a period of 10 years. Currently, the costs of the BAM group's data storage and backup service are covered by the central IT budget of BAM. In the case that the hard drive of the BAM server runs out of space, archival back-up on two external hard drives will be performed, which are stored in different labs. The overall data size of partner BAM, given the compact storage format used (pdf), is not expected to exceed 1 Tbyte, which is the size of a standard hard disk, available for currently less than 100 Euros. The two drives necessary amount to 200 € which will be covered by the budget dedicated to consumables.

4.2 CSIC

CSIC will not generate data in WP3 during their work in LiNaBioFluid.

4.3 Fraunhofer IPT

4.3.1 Summary

In WP3, Fraunhofer IPT will perform systematic laser processing experiments on hard inorganic materials to mimic lizard (Task 3.1) and bug (Task 3.2) integument structures. For this purpose, picosecond lasers are used to produce the structures. The results are characterised by SEM micrographs and 3-D measurements based on Focus-Variation.

Overview of datasets that are created in WP3

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
IPT Fabrication parameters WP3	3.1 Laser-based mimicking of lizard structures 3.2 Laser-based mimicking of bug structures	D 3.2: Images of first results of lizard-like surface morphologies D 3.4 Images of first results of bug-like surface morphologies Input for D3.1, D3.3, D3.5, D3.6
IPT SEM micrographs WP3	3.1 Laser-based mimicking of lizard structures 3.2 Laser-based mimicking of bug structures	D 3.2: Images of first results of lizard-like surface morphologies D 3.4 Images of first results of bug-like surface morphologies Input for D3.1, D3.3, D3.5, D3.6
IPT 3D measurement data WP3	3.1 Laser-based mimicking of lizard structures 3.2 Laser-based mimicking of bug structures	D 3.2: Images of first results of lizard-like surface morphologies D 3.4 Images of first results of bug-like surface morphologies Input for D3.1, D3.3, D3.5, D3.6

4.4 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	IPT Fabrication parameters WP3
Data set description	The fabrication parameters of the nano- and microstructures are collected: Laser parameters: power, frequency, polarization, polarization direction; Scanner parameters: mark speed, jump speed, focal position, other beam guidance parameters where relevant
Standards and metadata	The data will be collected in *.xlsx sheets. The size of one sheet is in the order of several 10 kB, which means that all sheets will probably not exceed several 10 MB at the end of the project. The data could be useful for all groups that would like to produce the same structures, especially for the project partners. It underpins scientific publications because the laser fluence and the effective number of pulses per unit area are calculated from these values. These parameters mainly influence the generation of nanostructures and are more meaningful for publications and reports. The other project partners will generate similar data sets, but as their laser system

	specifications are different, only laser fluence, the effective number of pulses per unit area and the polarization are comparable.
Data sharing	Relevant raw data will be shared with the project partners on demand. In internal and external reports as well as for scientific journals/ conference contributions, the more meaningful parameters polarization, laser fluence and effective number of pulses are published for interesting or important measurement results (SEM/ wetting tests/ tribological tests). The raw data can be opened with the software Microsoft Excel. It is stored on the institutional server in the project folder.
Archiving and preservation (storage and back up)	After the end of the project, the data is saved twice on CDs/DVDs and then is stored for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.

Data Set Details	
Dataset Name and reference	IPT SEM micrographs WP3
Data set description	The fabricated nano- and microstructures are examined under the SEM to analyse their size and shape.
Standards and metadata	The data is saved in *.tif format. For all SEM images, a measurement protocol is generated that is saved in a *.pdf file. The data of one image has a size of 800kB. At the end of the project, the size of all images will be in the order of several GB. The data could be useful for all partners and could underpin scientific publications. The other partners will have similar data sets but with different fabrication parameters.
Data sharing	All relevant images can be shared with the partners on demand. Important and interesting images will be presented to the partners in the reports and during meetings. In the case of scientifically interesting results, selected images will be published in journals or on conferences. The data will be stored on the institutional server in the project folder. To open the *.tif images, no special software is necessary. It can be opened for example with the software "Paint". With the software "Adobe Reader", the *.pdf files can be opened.
Archiving and preservation (storage and back up)	After the end of the project, the data is saved twice on CDs/DVDs and then is stored for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.

Data Set Details	
Dataset Name and reference	IPT 3D measurement data WP3
Data set description	The fabricated microstructures are measured with an optical measurement system for 3D measurements to make the structures visible and determine their size and shape.
Standards and metadata	The data and measurement information is saved in *.al3d, *.bmp and *.xml format which can be opened in the software "Alicona IF-MeasureSuite". One image has a size of about 15MB. In the end of the project, the size of all images will be in the order of several GB. It could be useful for all partners and could underpin scientific publications. The other partners will have similar data sets but with different fabrication parameters.
Data sharing	The data can be examined by the free software "AL3D-Viewer" from Alicona. Important and interesting images will be shared with the partners in the reports and during meetings. In the case of scientifically interesting results, selected images will be published in journals or on conferences. The data will be stored on the institutional server in the project folder.
Archiving	After the end of the project, the data is saved twice on CDs/DVDs and then is stored

and preservation (storage and back up)	for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.
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4.5 FORTH

4.5.1 Summary

In this work package , FORTH is involved with simulation and analysis of the complex physical mechanisms that characterize femtosecond laser generation of biomimetic micro-nanostructures and provide feedback for the experimental realization of such structures. To this end, it is expected to develop a library of laser conditions (i.e. fluence, pulse duration, number of pulses, repetition rate,etc) that will lead to particular opto/morphological changes on the irradiated material. The aim is to provide an optimized set of parameters. The investigation will be achieved by development of software code that will model the complex processes.

Overview of datasets that are created in WP3

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
Plots_of_Dynamical_evolution_of_prameters_simulation_name	T3.1 , T3.3	D3.1 , D3.3
Results_simulation_name_date_version	T3.1 , T3.3	D3.1 , D3.3

4.5.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	Plots_of_Dynamical_evolution_of_prameters_simulation_name
Data set description	Figures-plots of dynamical evolution of parameters (visualization of results) of changes of the materials properties.
Standards and metadata	The file formats used for the datasets are envisioned to be .mat files (MatLab files) and .txt (text files). Visualisation of the results will be provided in .JPG format. No metadata will be used.
Data sharing	The data will be accessible via contact provided in the contact directory at the LiNaBioFluid website. The access will be provided after communication with FORTH.
Archiving and preservation (storage and back up)	The data will be stored both locally by using hard drive storage located at facilities of FORTH and on the web by using a proper cloud service. The data will be accessible for minimum of 5 years after the end of the project. The storage costs will be covered by the overhead costs of the organisation.

Data Set Details	
Dataset Name and reference	Results_simulation_name_date_version
Data set description	Results of code execution and coupling of models on various time scales

Standards and metadata	The file formats used for the datasets are envisioned to be .mat files (MatLab files) and .txt (text files). Visualisation of the results will be provided in .JPG format. No metadata will be used.
Data sharing	The data will be accessible via contact provided in the contact directory at the LiNaBioFluid website. The access will be provided after communication with FORTH.
Archiving and preservation (storage and back up)	The data will be stored both locally by using hard drive storage located at facilities of FORTH and on the web by using a proper cloud service. The data will be accessible for minimum of 5 years after the end of the project. The storage costs will be covered by the overhead costs of the organisation

4.6 HTC

HTC will not generate data in WP3 during their work in LiNaBioFluid.

4.7 JKU and RWTH

JKU and RWTH will not generate data in WP3 during their work in LiNaBioFluid.

5. Data Management plan for WP4

5.1 BAM

BAM is not involved in WP4.

5.2 CSIC

5.2.1 Summary

Overview of datasets that are created in WP4

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
LNBF-WP4-CSIC-summary-date.pdf	Task 4.1, Task 4.2, Task 4.3	D4.1, D4.2, D4.3, D4.4

5.2.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	The file name will be structured as follows: LNBF-WP4-CSIC-summary-date.pdf
Data set description	Periodic summaries of research data in form of pdf files as a universal format containing all project-relevant data.

Standards and metadata	The first page of the periodic summary will describe the type of data collected, where it was collected, the conditions under which it was collected. The last page will contain conclusions and comment on whether it underpins a scientific publication or results from other partners and give information on the existence (or not) of similar data and the possibilities for integration and reuse and to whom it could be useful.
Data sharing	Data will be shared only internally with other partners in order to prevent competitors to benefit from the project before the partners can benefit. In the cases when the dataset contains intellectual property relevant data it will not be shared.
Archiving and preservation (storage and back up)	The repository where the data will be stored is at the CSIC group on a hard drive on a server that is backed-up every night onto a second hard drive in another lab, as well as on the LiNaBioFluid website which, is also backed up regularly. In the case that the hard disks run out of space, archival back-up on three sets of DVD drives will be performed, stored in different labs and at the location of different partners. The data shall be stored for a period of 10 years. The overall data size of partner CSIC, given the compact storage format used (pdf), will not exceed 1 Tbyte, which is the size of a standard hard disk, available for less than 100 Euros. The three drives necessary amount to 300 € which will be covered for by budget dedicated to consumables.

5.3 Fraunhofer IPT

5.3.1 Summary

First, Fraunhofer IPT will extend the functional surfaces with lizard-like and bug-like structures over relatively large areas (1 cm²) with a high-power, high repetition picosecond laser (Task 4.1). Afterwards, the functional areas will be scaled up again to manufacturing size (Task 4.2). In the end, a demonstrator workpiece will be fabricated (Task 4.3).

Overview of datasets that are created in WP4

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
IPT Fabrication parameters WP4	Task 4.1 large area laser structures Task 4.2 Scale up to manufacturing size Task 4.3 proof-of-principle slide bearing	D4.1, D4.2, D4.3, D4.4
IPT SEM micrographs WP4	Task 4.1 large area laser structures Task 4.2 Scale up to manufacturing size Task 4.3 proof-of-principle slide bearing	D4.2, D4.3, D4.4
IPT 3D measurement data WP4	Task 4.1 large area laser structures Task 4.2 Scale up to manufacturing size Task 4.3 proof-of-principle slide bearing	D4.2, D4.3, D4.4
IPT CAD/CAM data WP4	Task 4.1 large area laser structures Task 4.2 Scale up to manufacturing size Task 4.3 proof-of-principle slide bearing	D4.1, D4.2, D4.3, D4.4

5.3.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	IPT Fabrication parameters WP4
Data set description	The fabrication parameters of the nano- and microstructures are collected: Laser parameters: power, frequency, polarization, polarization direction; Scanner parameters: mark speed, jump speed, focal position, other beam guidance parameters where relevant
Standards and metadata	The data will be collected in *.xlsx sheets. The size of one sheet is in the order of several 10 kB, which means that all sheets will probably not exceed several 10 MB at the end of the project. The data could be useful for all groups that would like to produce the same structures, especially for the project partners. It underpins scientific publications because the laser fluence and the effective number of pulses per unit area are calculated from these values. These parameters mainly influence the generation of nanostructures and are more meaningful for publications and reports. The other project partners will generate similar data sets, but as their laser system specifications are different, only laser fluence, the effective number of pulses per unit area and the polarization are comparable.
Data sharing	Relevant raw data will be shared with the project partners on demand. In internal and external reports as well as for scientific journals/ conference contributions, the more meaningful parameters polarization laser fluence and effective number of pulses are published for interesting or important measurement results (SEM/ wetting tests/ tribological tests). The raw data can be opened with the software Microsoft Excel. It is stored on the institutional server in the project folder.
Archiving and preservation (storage and back up)	After the end of the project, the data is saved twice on CDs/DVDs and then is stored for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.

Data Set Details	
Dataset Name and reference	IPT SEM micrographs WP4
Data set description	The fabricated nano- and microstructures are examined under the SEM to analyse their size and shape.
Standards and metadata	The data is saved in *.tif format. For all SEM images, a measurement protocol is generated that is saved in a *.pdf file. The data of one image has a size of 800kB. At the end of the project, the size of all images will be in the order of several GB. The data could be useful for all partners and could underpin scientific publications. The other partners will have similar data sets but with different fabrication parameters.
Data sharing	All relevant images can be shared with the partners on demand. Important and interesting images will be presented to the partners in the reports and during meetings. In the case of scientifically interesting results, selected images will be published in journals or on conferences. The data will be stored on the institutional server in the project folder. To open the *.tif images, no special software is necessary. It can be opened for example with the software "Paint". With the software "Adobe Reader", the *.pdf files can be opened.
Archiving and preservation (storage and back up)	After the end of the project, the data is saved twice on CDs/DVDs and then is stored for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.

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Data Set Details	
Dataset Name and reference	IPT 3D measurement data WP4
Data set description	The fabricated microstructures are measured with an optical measurement system for 3D measurements to make the structures visible and determine their size and shape.
Standards and metadata	The data and measurement information is saved in *.al3d, *.bmp and *.xml format which can be opened in the software "Alicona IF-MeasureSuite". One image has a size of about 15MB. In the end of the project, the size of all images will be in the order of several GB. It could be useful for all partners and could underpin scientific publications. The other partners will have similar data sets but with different fabrication parameters.
Data sharing	The data can be examined by the free software "AL3D-Viewer" from Alicona. Important and interesting images will be shared with the partners in the reports and during meetings. In the case of scientifically interesting results, selected images will be published in journals or on conferences. The data will be stored on the institutional server in the project folder.
Archiving and preservation (storage and back up)	After the end of the project, the data is saved twice on CDs/DVDs and then is stored for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.

Data Set Details	
Dataset Name and reference	IPT CAD/CAM data WP4
Data set description	For all laser processing steps for which a special geometry is required, a CAD file is generated. With this data, the laser path is calculated and saved in a CAM file.
Standards and metadata	The 3-D model of the functional surface (including structure details) will be generated using CAD software, such as "Rhinoceros" or "Siemens NX". Each software product uses its own proprietary data format. To assure later access to the CAD data, the geometry information will additionally be stored in an open data format (such as IGES or STL). The size of the files strongly depends on the complexity and dimensions of the structure and can easily exceed several 10 MB per file. Special CAM software developed by Fraunhofer IPT uses this information to calculate paths for the machine axes and the laser scanner. This data consists of a Heidenhain program *.h (size per file several kB) including all machine commands, and several scanner programs in *.mpf file format (size per file several 10 MB), fulfilling NC-code standards. The geometrical CAD data can be useful for the other partners. Certain values of the structure design can also underpin scientific publications, but not the whole data set. The CAM data is machine-dependent and cannot be directly used by any of the other partners.
Data sharing	The relevant CAD data can be shared with the partners on demand. It will not be made externally available for reasons of intellectual properties. The data can be opened with the original software (for the native data formats) or any 3-D modelling tool (for IGES and STL files). The CAM data can be read by any text editor. The data will be stored on the institutional server in the project folder. The CAM data is defined as not shareable data (as explained before).
Archiving and preservation (storage and back up)	After the end of the project, the data is saved twice on CDs/DVDs and then is stored for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.

5.4 FORTH

FORTH will not generate shareable data in WP4 during their work in LiNaBioFluid.

5.5 HTC

5.5.1 Summary

The work of HTC in WP 4 focuses on the characterization of the tribological behavior of the structured surfaces in comparison with the unstructured samples of different inorganic materials. HTC is also involved in the design of a suitable demonstrator. The data collected at HTC will include optical microscopy pictures of the structures before and after tribological testing (wear analysis). Further there will be data of the tribological characterisation itself including coefficient of friction, sliding speed and normal force. These data will be summarized to a pdf file.

Overview of datasets that are created in WP4

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
LiNaBioFluid_WP4_summary_date_HTC	Task 4.1, 4.3	D4.1, 4.2, 4.3, 4.4

5.5.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	LiNaBioFluid_WP4_summary_date_HTC
Data set description	The summary will describe the test conditions
Standards and metadata	The data will include pictures of the structures before and after tribological testing (optical microscopy). There will be a page with comments and conclusions, including data of partners if relevant.
Data sharing	Data will be shared with the project partners. Intellectual property relevant data will not be shared.
Archiving and preservation (storage and back up)	The raw data will be stored on the computer of the measurement device which is used to collect the data. The processed data will be stored on a server of the HTC which is backed up regularly. The costs for the data storage will be covered by HTC/Miba-Group IT. The data will be stored for an indefinite time, at least for 15 years. Due to the compact format used the volume should be less than 1 TByte. The volume of the raw data cannot be determined yet. If the raw data exceeds the current space it will be stored on external hard drives, the costs of these will be covered by the HTC budget

5.6 JKU and RWTH

JKU and RWTH will not generate data in WP4 during their work in LiNaBioFluid.

6. Data Management plan for WP5

6.1 BAM

6.1.1 Summary

During LiNaBioFluid project, BAM is expecting to generate scientific articles and conference contributions. BAM will produce periodically summaries of publication, dissemination and exploitation activities in form of pdf files as a universal format containing all project-relevant data.

Overview of datasets that are created in WP5

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
LNBF-WP5-BAM-summary-date.pdf	Tasks 5.1, 5.2	D5.1 to D5.10
LNBF-WP5-BAM-publications-date.pdf	Tasks 5.1	D5.2

6.1.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	LNBF-WP5-BAM-summary-date.pdf
Data set description	The periodic summary will list all LiNaBioFluid publication, dissemination and exploitation activities performed at BAM.
Standards and metadata	For official presentations and publications, the dataset will include the titles, author names, abstracts, and information on the date and location.
Data sharing	The dataset will be shared with all project partners on the internal part of the LiNaBioFluid webpage. Additionally, it will be stored at the BAM group on a hard drive on a server. Complementary copyright protected publications will be shared with the project partners in the internal area of the LiNaBioFluid webpage.
Archiving and preservation (storage and back up)	The dataset will be stored at the BAM group repository on a hard drive on a server that is backed-up automatically and regularly by the BAM IT department, as well as on the LiNaBioFluid website which. The LiNaBioFluid data shall be preserved for a period of 10 years. Currently, the costs of the BAM groups data storage and backup service are covered by the central IT budget of BAM.

Data Set Details	
Dataset Name and reference	LNBF-WP5-BAM-publications-date.pdf
Data set description	The periodic summary will list all LiNaBioFluid publication activities involving the partner BAM.
Standards and metadata	For official presentations and publications, the dataset will include the titles, author names, abstracts, and information on the date and location, etc.
Data	The dataset of official presentations and publications can be shared publically via the

sharing	LiNaBioFluid webpage. Additionally, it will be stored at the BAM group on a hard drive on a server. Complementary copyright protected publications will be shared with the project partners in the internal area of the LiNaBioFluid webpage.
Archiving and preservation (storage and back up)	The dataset will be stored at the BAM group repository on a hard drive on a server that is backed-up automatically and regularly by the BAM IT department, as well as on the LiNaBioFluid website which. The LiNaBioFluid data shall be preserved for a period of 10 years. Currently, the costs of the BAM groups data storage and backup service are covered by the central IT budget of BAM.

6.2 CSIC

During LiNaBioFluid project, CSIC is expecting to generate scientific articles and conference contributions. The data management plan for the products of these activities is illustrated below.

6.2.1 Summary

Overview of datasets that are created in WP5

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
LNBF-WP5-CSIC-paper-date.pdf	Writing and publication of scientific articles	D5.2 Scientific articles and conference contributions
LNBF-WP5-CSIC-conference-date.pdf	Identification of related conferences and submission and presentation of contributions	D5.2 Scientific articles and conference contributions

6.2.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	The file name of the data set will be structured as follows: LNBF-WP5-CSIC-paper-date.pdf
Data set description	Scientific articles published in international journals
Standards and metadata	The data consists of a pdf file of a scientific contribution submitted to an international journal at a stage when it has been accepted for publication. Being accepted, its usefulness is implicit and so is its context with respect to other scientific publications.
Data sharing	We will (a) as soon as possible and at the latest on publication, deposit a copy of the published version or accepted manuscript in a repository for scientific publications; (b) ensure open access to the deposited publication — via the repository — at the latest: (i) on publication, if an electronic version is available for free via the publisher, or (ii) within six months of publication in any other case. (c) ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication.
Archiving and preservation (storage and back up)	The repository where the data will be stored is at the CSIC group on a hard drive on a server that is backed-up every night onto a second hard drive in another lab, as well as on the LiNaBioFluid website which, is also backed up regularly. In the case that the hard disks run out of space, archival back-up on three sets of DVD drives will be performed, stored in different labs and at the location of different partners. The data shall be stored for a period of 10 years. The overall data size of partner CSIC, given the compact storage format used (pdf), will not exceed 1 Tbyte, which is the size of a standard hard disk, available for less than 100 Euros. The three drives necessary

	amount to 300 € which will be covered for by budget dedicated to consumables.
Dataset Name and reference	The file name of the data set will be structured as follows: LNBF-WP5-CSIC-conference-date.pdf
Data set description	Accepted contribution to an international conference
Standards and metadata	Abstract of the accepted contribution and details of the conference
Data sharing	We will as soon as possible and at the latest after the conference, deposit a copy of the accepted conference abstract in a repository for scientific publications.
Archiving and preservation (storage and back up)	The repository where the data will be stored is at the CSIC group on a hard drive on a server that is backed-up every night onto a second hard drive in another lab, as well as on the LiNaBioFluid website which, is also backed up regularly. In the case that the hard disks run out of space, archival back-up on three sets of DVD drives will be performed, stored in different labs and at the location of different partners. The data shall be stored for a period of 10 years. The overall data size of partner CSIC, given the compact storage format used (pdf), will not exceed 1 Tbyte, which is the size of a standard hard disk, available for less than 100 Euros. The three drives necessary amount to 300 € which will be covered for by budget dedicated to consumables.

6.3 Fraunhofer IPT

6.3.1 Summary

Fraunhofer IPT is work-package leader of WP 5. The tasks include the dissemination (Task 5.1) and exploitation (Task 5.2) as well as the generation of an exploitation plan and a data base of interests.

Overview of datasets that are created in WP5

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
Articles/ Plans/ Data base of interests	5.1, 5.2	D5.1, D5.2, D5.5, D5.7, D5.8

6.3.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	Articles/ Plans/ Data base of interests
Data set description	This data includes text sheets for scientific or other articles related to the project as well as the documents for the exploitation plan and the data base of interests.
Standards and metadata	The articles are written in *.docx documents that can be opened with the software "Microsoft Word". It will probably have a scale of several 10 MB. It is useful for all partners. It does not underpin a scientific publication. The dissemination plan is a similar data set. It could serve as template for the exploitation plan and vice versa.
Data sharing	All documents will be shared with the partners. The articles are published anyway and the plans will be uploaded to the partner's domain of the project website. The software "Microsoft Word" is necessary to read the data.

	The data will be stored on the institutional server in the project folder.
Archiving and preservation (storage and back up)	After the end of the project, the data is saved twice on CDs/DVDs and then is stored for 10 years at Fraunhofer IPT. The estimated final amount of data is in the order of several 10 MB. The associated costs for storage are covered by the overhead costs of the institute.

6.4 FORTH

FORTH is expecting to create highly publishable results during LiNaBioFluid, these results will be available in form of papers.

Overview of datasets that are created in WP5

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
LNBF_Paper_name_publication_date_	5.1, 5.2	D5.1, D5.2, D5.5, D5.7, D5.8

6.4.1 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	LNBF_Paper_name_publication_date
Data set description	Scientific article published in international Journals
Standards and metadata	The files will be in .pdf format and would be readable with Adobe Acrobat. Papers will be assigned with DOI.
Data sharing	The data will be accessible via contact provided in the contact directory at the LiNaBioFluid website. The access will be provided after communication with FORTH. Abstracts will be also provided on the LiNaBioFluid website.
Archiving and preservation (storage and back up)	The data will be stored both locally by using hard drive storage located at facilities of FORTH and on the web by using a proper cloud service. The data will be accessible for minimum of 5 years after the end of the project. The storage costs will be covered by the overhead costs of the organisation

6.5 HTC

6.5.1 Summary

HTC will produce summaries of publications, dissemination and exploitation activities if there are any.

Overview of datasets that are created in WP5

Dataset Name	Tasks Associated with the dataset	Deliverables associated with the dataset
LiNaBioFluid_WP5_summary_date_HTC	Task 5.1, 5.2	D5.1 to 5.10

6.5.2 Detailed Description of the datasets

Data Set Details	
Dataset Name and reference	LiNaBioFluid_WP5_summary_date_HTC
Data set description	The summary will list all activities concerning WP5 performed at HTC
Standards and metadata	For official presentations the dataset will include title, authors, abstracts, date and location.
Data sharing	The dataset will be shared with all project partners.
Archiving and preservation (storage and back up)	The dataset will be stored at the HTC on a server which is backed-up regularly. The data will be stored for an indefinite time, at least for 15 years. The costs of the storage will be covered by HTC/Miba-Group IT.

6.6 JKU and RWTH

JKU and RWTH will not generate data in WP5 during their work in LiNaBioFluid.