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**IgnitePLASMA**

A minimally Invasive surgical platform aGainst paNcreatIc  
and biliary Tract cancErs

Project: [HORIZON-EIC-2023-PATHFINDEROPEN-01](#) Grant #101129853#

## **D4.3**

**Data management plan (DMP):**

*Collection, storing, making  
interoperable sets of data*



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<b>Partner</b>	University of Patras (UP)	Greece
<b>Associated Partner</b>	Synnouos Limited (SLtd)	United Kingdom
<b>Associated Partner</b>	Bank of Cyprus Oncology Centre (BoCOC)	Cyprus

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## Authors / Contributors

**Deliverable author:**

Ioanna Kambili (SLtd)

**Contributors:**

Dr Vasileios Vavourakis (UCY)

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## 1. Introduction

IgnitePLASMA is an EIC (European Innovation Council) pathfinder project part of the Horizon Europe program that is developing a surgical platform based on cold atmospheric plasma (CAP) for the treatment of pancreatic and biliary tract cancers. This four-year project (1/4/2024-31/3/2028) brings together the following three beneficiaries: University of Cyprus (UCY; *Coordinator*), Sorbonne University (SU), University of Patras (UP), and the following two associated partners: Synnous Limited (SLtd), Bank of Cyprus Oncology Centre (BoCOC).

The project is structured in five work packages (WPs). The R&D of IgnitePLASMA extends through WP1 to WP3, whereas project dissemination, exploitation and communication concerns WP4, and the project is managed through WP5. Further details about IgnitePLASMA are provided in the project website: <https://igniteplasma.eu/>.

This deliverable, D4.3, reports the work effort of task 4.2 that is part of WP2. In D4.3, the first version of the data management plan (DMP) is introduced such that the key elements, which will facilitate the potential reuse of the data collected and processed within the IgnitePLASMA project, will be defined. The DMP will ensure that the project data will be **F**indable, **A**ccessible, **I**nteroperable and **R**eusable (FAIR), in accordance with the Horizon Europe (HE) open research practices; thus, this report has been elaborated following the guidelines for data management in HE documents.

## 2. Scope of the document

The purpose of this document and the objective of the DMP is to specify the data governance and handling of data in the project in the form of initial project guidelines, the types of data expected to be generated in the project, whether and how it will be made open and accessible for verification and re-use, how it will be curated and preserved, and outlines ethical, privacy, and security issues. Thus, D4.2:

- identifies and lists the data and pertinent output that IgnitePLASMA will produce
- defines how these data will be made 'FAIR' (Findable, Accessible, Interoperable, Reusable)
- defines the allocation of resources (costs and responsibility) for the management of the data during and after IgnitePLASMA's lifetime
- identifies ethical and security matters, and
- defines procedures for data recovery, data safe storage during the project and long-term preservation.

### 3. Project data

In IgnitePLASMA, all partners (UCY, SU, UP, SLtd) are expected to produce data during the project as it will be documented in the DMP report. A concise summary of the kind of data, the type of data and the partner in charge to produce these data is tabulated in the following subsection. However, in this project, data are broadly identified in two categories:

- **‘Open data’**: data which will be freely available online through repositories
- **‘Controlled/Restricted data’**: data whose access is restricted based on being used for commercial reasons, hence, prohibiting their open release.

In the ‘Controlled/Restricted data’ category, the corresponding owners of the respective data will give full access to project collaborators while access to potential secondary users should meet certain criteria of confidentiality. Moreover, in this project we do not anticipate having any **‘Closed data’** that should be permanently embargoed, i.e., restricted from being published internally and externally.

#### 3.1 Data summary

The table below summarizes the datasets that are expected to be produced in the project, which have been categorized based on the R&D topic and the corresponding work package (WP) of the project. Per each dataset, we provide an outline description of the data involved, the type of data and the extension of the corresponding files, and the project partner in charge gathering, reviewing, curating and assessing the quality of the data.

Dataset Title <i>Outline description</i>	Type of data <i>File extensions</i>	Partner in charge	WP
<b>Plasma platform design and characterisation</b> <i>This dataset consists of information that is related to the plasma platform design and implementation as well as to the physical quantities that will be recorded during the platform characterisation (electrical, optical, thermal, etc. measurements).</i>	<ul style="list-style-type: none"> <li>• Reports/Presentations: pdf, docx, tex, pptx/ppsx</li> <li>• Pictures/Picture sequences/Videos: jpeg, png, tif, eps, svg, avi, mp4, wmv</li> <li>• Spreadsheets/Databases: xls, csv</li> <li>• Computer-aided Design: stl, ply, dwg, dxf, iges, step, sldprt, sldasm, jt</li> <li>• Scripting/Programming code: c, cxx/cpp/C, py, m, sh</li> <li>• Markdown/Documentation: md, html, dox, txt (<i>ASCII</i> only), xml</li> </ul>	UP	1
<b>Cancer biology data</b> <i>This dataset consists of information that is related to the in vitro and in vivo cancer research laboratory work, i.e., experimental design, results generated from experiments, experimental protocols and reports.</i>	<ul style="list-style-type: none"> <li>• Reports/Protocols/Presentations: pdf, docx, tex, pptx/ppsx</li> <li>• Pictures/Picture sequences/Microscopy/Videos: jpeg, png, tif, eps, svg, avi, mp4, wmv, dcm, vti</li> <li>• Spreadsheets/Databases: xls, csv</li> </ul>	SU	2
<b>In Silico modelling data</b> <i>This dataset consists of information that is related to the in-silico modelling work, i.e., reports that document the simulation software, source code of the simulation software, input and output data to</i>	<ul style="list-style-type: none"> <li>• Reports/Presentations: pdf, docx, tex, pptx/ppsx</li> <li>• Pictures/Picture sequences/Videos: jpeg, png, tif, eps, svg, avi, mp4, wmv</li> <li>• Spreadsheets/Databases: xls, csv, mat</li> <li>• Computer-aided Analysis/Simulations: cas, cds, foam,</li> </ul>	UCY	3

<i>run the simulations, and pertinent simulation and post-processing results.</i>	ex2, pvd, vtu, pvtu, vtk, tec, csv, xml, dat ( <i>ASCII</i> or <i>binary</i> ) <ul style="list-style-type: none"> <li>• Scripting/Programming code: c, cxx/cpp/C, py, m, sh</li> <li>• Markdown/Documentation: md, html, dox, txt (<i>ASCII</i> only), xml</li> </ul>		
<b>Dissemination data</b> <i>This dataset consists of information that is related to the outreach work, i.e., social media, internet public articles</i>	<ul style="list-style-type: none"> <li>• Reports/Presentations/Fliers: pdf, docx, tex, pptx/ppsx</li> <li>• Markdown/Documentation: md, html, dox, txt (<i>ASCII</i> only), xml</li> </ul>	SLtd	4

### 3.2 FAIR data

This subsection has been prepared based on the HE guidelines and standards for data that is Findable, Accessible, Interoperable and Reusable (FAIR), as documented in following portal: <https://horizoneuropencppportal.eu/repository/5b7fcc0e-73da-4e76-8b46-3682a36fa59b>, and follows the corresponding template for DMP, as documented in the following Word file: [https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/template-report/data-management-plan\\_he\\_en.docx](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/template-report/data-management-plan_he_en.docx).

#### 3.2.1 Findable data and metadata

Discoverability and identifiability of research data will be facilitated by the provision of pertinent metadata in the IgnitePLASMA project. Thus, the datasets, i.e. from laboratory and computer experiments, in this project will have an associated metadata document (stored as a markdown *\*.md* or and *\*.xml* file) that will describe key aspects of the corresponding annotated data. The creators of the datasets will opt for either a ‘*Core Schema*,’ which will include basic metadata properties such as title, description, keywords, etc., or an ‘*Extension Schema*’ that expands on the previous schema by adding more detailed information like release status, copyright and additional administrative details.

In the ‘*Core Schema*’ the following metadata elements will be covered:

- Title [title of the deposition]
- Subject and purpose [abstract or description for deposition]
- File(s) [deposition files identifiers, filenames, size of the files in bytes and MD5 checksum of files]
- Description, type and format of the dataset [description of type of the deposition from a controlled vocabulary (publication, dataset, software, ...)]
- Keywords [free form keywords for this deposition]
- Creator(s) or author(s) [the creator(s) or/and author(s) of the deposition]
- Time and date of creation [date of publication in ISO8601 format (YYYY-MM-DD)]
- Language [Notification: the preferred working language for this project is English]
- Identifier, or DOI if available [Digital Object Identifier assigned by the DOI registrant (e.g., Zenodo, figshare), also used for versioning]

while in the ‘*Extension Schema*’ the following metadata elements will be covered additionally:

- Reviewer(s) [reviewer(s) overseen of the deposition]
- Copyright information, and usage rights

- Property release status [license from controlled vocabulary “Open Definition Licenses Service”]
- Location of data creation / Origination [location the data of the deposition originated from]
- Location of data storage [persistent location of storage of the deposition]

Search keywords, used as tags or labels, will be provided in the metadata files to optimize the possibility for discovery and then potential re-use. Additionally, unique identifiers and labels will be provided in such a way that dataset can be harvested from online search engines. Optionally, a DOI name will be provided to facilitate persistent online identification of major research output items and objects of the IgnitePLASMA project.

Where appropriate, filenames will include the creation date in ‘YYYYMMDD’ format – deliverable reports will have a data identification sheet and a version log. Version control and management will be applied however in non-binary coded electronic records and data files. In this regard, we will be using Git which is an established distributed version control system – Git is often used to control source code developed by computer software programmers. Git is a free and open-source software (shared under the GPL-2.0-only license) and is being used by well-established repository services such as GitHub, SourceForge, Bitbucket and GitLab.

### 3.2.2 Openly accessible data

In principle, IgnitePLASMA follows the Horizon Europe guidance on Open Science practices\*: *Open science is an approach based on open cooperative work and systematic sharing of knowledge and tools as early and widely as possible in the process. It has the potential to increase the quality and efficiency of research and accelerate the advancement of knowledge and innovation by sharing results, making them more reusable and improving their reproducibility. It entails the involvement of all relevant knowledge actors.*

The different types of data (see table in subsection 3.1) that are generated during IgnitePLASMA are open by default with the following general exceptions:

- Copyright and permissions for reusing third-party data or prospective data from the partners that are embargoed.
- Internally generated content that are attributed to confidentiality issues.
- Data that are to be exploited commercially through the EIC marketplace and will not be made open.

Currently in this project, no partner intends to opt-out from the open data pilot. If this needs to change or adapted for a particular situation during the project, the consortium agreement will be amended while the DMP will be updated accordingly. Moreover, in case an embargo needs to be applied such that more time is required by the partners to publish or seek protection of the intellectual property (e.g. patents), the embargo will be 12 months long at most, and the research data will be made available afterwards, or as soon as possible the partners agree to release the data.

The IgnitePLASMA open results will thus be made accessible according to the rules for Open Science. All open results (e.g., data, code, software, scientific publications) of the project will be openly accessible using appropriate open access repositories as soon as possible. For this purpose we will prioritize using the following cloud-based repositories for data: Zenodo (<https://zenodo.org>),

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\* HE Programme Guide: V2.0–11.04.2022, Section: Open Science: [https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/program-me-guide\\_horizon\\_en.pdf](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/program-me-guide_horizon_en.pdf)

Mendeley Data (<https://data.mendeley.com>), figshare (<https://figshare.com>) and Dryad Digital Repository (<https://datadryad.org>). Specifically, for computer codes and algorithms we prioritize using the following cloud-based repositories: GitHub (<https://github.com>), Bitbucket (<https://bitbucket.org>) and GitLab (<https://about.gitlab.com>). In addition, research data needed to validate the results in the scientific publications will be deposited in a data repository at the same time as a publication. Non-public research data will be archived using any of the aforementioned repositories by adopting a restricted access option. When a restriction on open access to our research data is deemed necessary, we will make data available under controlled conditions to the community. In case when restricted or embargoed datasets are stored in Zenodo or figshare, information about the restricted data will be published in the repository and we will provide information about when the data will become available. The files of restricted-access datasets will be visible only to the respective owners and to the project coordinator. Restricted access will allow a researcher to upload a dataset and provide the conditions under which they will grant access to interested (external) users from the community. Thus, in case an external user wishes to request access will have to provide a justification for how they fulfil these conditions, while the dataset owner(s) will be notified by the repository system for each new request, and the dataset owner(s) will subsequently decide to either accept or reject the request. If the request is accepted, the external user will receive a unique, one-time use secret link that will typically expire within 2 weeks. With regards to the scientific publications, open access to peer-reviewed material (research articles, reviews, proceedings, etc.) can be ensured either by publishing in green open access journals (i.e., open access journals) or gold open access journals (i.e., open access publishing journals) and conferences. Thus, scientific publications from this project and related bibliographic metadata will be made available as open access. This will be disseminated through the project website (<https://igniteplasma.eu/publications>) and the OpenAIRE portal (<https://www.openaire.eu>). To expedite the process reporting our scientific output in OpenAIRE, the publications will be deposited in OpenAIRE-compliant journals and their respective repositories (i.e., these can be found online via <https://doaj.org>). Also, we will make use of the following online open access archive and distribution services for unpublished preprints: <https://arxiv.org> and <https://www.biorxiv.org>.

Regarding the accessing of the datasets deposited as data files in a data repository, there are no special methods or software tools needed for this project. To ensure however that data management procedures are unified across the project, a project-default procedure for restricted and open access repository for data storage will be managed. First, each owner / creator of the dataset will be responsible to keep a safely stored local copy of their data and will be then responsible to upload a copy of their data to a dedicated server that will be hosted by the project coordinator, UCY. The files (including metadata) will be uploaded by the owner via a secure file transfer protocol, the server of which will be accessible to all project members using a two-factor authentication protocol. The project has allocated funds in the budget to keep the data at UCY's dedicated server for 10 years from the project start (i.e., until May 2034). Second, the owner / creator of the dataset will be responsible to upload their data (and metadata) in any of the aforementioned cloud-based repositories as soon as possible, unless an embargo is in place and data should be kept from getting published until further notice by the owner(s) of these sensitive data. Once the data are published through these repositories, the software tools needed to access the data will be provided by the respective repository service provider (and will come together with the respective documentation how to use that service, with appropriate version control, and metadata management).

The default repository for depositing publications, open data, associated metadata and open source software is Zenodo, an EC-funded, multidisciplinary repository for publications and data. A DOI will be automatically assigned to all Zenodo files, which can be uploaded in any file format. Zenodo will allow the project members to deposit both their publications and research data, while providing means to link them. Zenodo is compliant with the open data requirements of Horizon Europe, the EU Research and Innovation funding programme, and OpenAIRE. Furthermore, we have established a

(community) project page for IgnitePLASMA at <https://zenodo.org/communities/igniteplasma> for direct and easy upload of project datasets by its members. In addition to Zenodo, GitHub will be also used for depositing open-source software and code.

Finally, we report that we have identified no conflicts on background or/and pre-existing IP knowledge related to the existing data produced by the project partners. ‘IP created’ in the project that relates to new data will be listed in the final report and will be the property of those partners that have contributed to generating these data. Also, data produced through IgnitePLASMA will be made available to all partners of the project and will be treated as ‘Controlled/Restricted data,’ unless otherwise agreed by the partners and therefore data will be considered as ‘Open data.’

### 3.2.3 Interoperable data

To facilitate interoperable data and processes, IgnitePLASMA will strive to meet the following three requirements:

- data standardization
- semantic interoperability
- data exchange

To ensure and maximise data standardization we have adopted established standard data formats, coding systems, and communication protocols, so that project data can be easily understood by different digital platforms that may run on different operating systems for example (Linux or UNIX, Windows, macOS). More specifically, the table in subsection 3.1 lists the different types of data that will be produced in this project. The file extensions of these data (e.g., imaging, videos, simulations, code, etc.) are selected such that standardization is ensured.

Semantic interoperability concerns the capacity for the dataset being such that different systems, used either within the project or externally by the community, will interpret data in the same way. Thus, semantic interoperability avoids and prevents errors during data exchange. With an exception to the files that are inherently non-standardised, e.g. \*.txt, \*.dat, \*.csv or \*.md files, they will be parsed and converted into XML format to facilitate semantic interoperability in this regard. Transformation modules exist to convert a variety of non-XML formats, including CSVs, delimited and fixed-width files, EDI ANSI X12 and other HIPAA formats, JSON and Microsoft Excel format respectively. This way data interoperability will permit data exchange and re-use within and across the disciplines involved in the project, i.e., mathematics, engineering, physics, computer science, biology and medicine. Where appropriate, our data will include qualified references to other datasets, e.g., data produced from other R&D projects or from IgnitePLASMA as well, or datasets from published resources and established databases, see for example the reviews of Baxevanis<sup>†</sup> and Villalba & Matte<sup>‡</sup>.

Interoperable data would also necessitate that linked systems that can easily connect and communicate with each other through application programming interfaces (APIs). In this project we will not build such infrastructure, however, IgnitePLASMA’s data interoperability we will be ensured through the use of established repositories, established/standardised file formats and database protocols (see for example the metadata schemas in paragraph 3.2.1). As such, data exchange will be made possible explicitly through interoperability across different systems without losing meaning or structure of the project data, while exchange of the data will be allowed to occur directly in real time

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<sup>†</sup> Baxevanis 2001. *Nucleic Acids Res.* <https://doi.org/10.1093%2Fnar%2F29.1.1>

<sup>‡</sup> Villalba & Matte 2021. *Genet Mol Biol.* <https://doi.org/10.1590%2F1678-4685-GMB-2020-0203>

or through batch processes, via the online repositories used to store the data (e.g., Zenodo). For the internal use and sharing of the data, we will facilitate institutional data servers via secure file transfer protocol (SFTP) to enable transfer of data amongst the partners.

### 3.2.4 Data re-usability

Open data and open-source software will be licensed to permit both data and code re-use. According to article 16 of the Grant Agreement, data and software are owned by the project member(s) that generates them. As such, owner(s) of data and results produced within the IgnitePLASMA project will be encouraged to release their work under a Creative Commons license, preferably the permissive Creative Commons Attribution (CC BY-4.0; <https://creativecommons.org/licenses/by/4.0/>) or for the less permissive Creative Commons Attribution NonCommercial-NoDerivs (CC BY-NC-ND-4.0; <https://creativecommons.org/licenses/by-nc-nd/4.0/>). Software, source code, model outputs and technical documentation of the software (everything that is not subject to any IPR or patenting issues) will be licenced following an LGPL v3 license (<https://www.gnu.org/licenses/lgpl-3.0.en.html>), while in case a permissive software license is permitted, then the MIT license (<https://opensource.org/license/mit>) will be adopted. Regarding scientific publications, the authors of the scientific manuscripts that are produced within the IgnitePLASMA project will be encouraged to seek an agreement with the scientific publisher of the publication that will allow the authors to retain ownership of the copyright for their work and permits them to deposit the publication in an Open Access repository. Thus, open data and open-source software will be made freely available in the public domain (see paragraph 3.2.2 for details) to permit the widest re-use possible. Research data needed to accompany results of scientific publications will be made available as open access at the same time as the publication (research article), while open-source software will be released by the owners the soonest possible after (verification / validation) tests and documentation has been completed. If an embargo period is imposed by the publisher, the publication and the related data are not made openly accessible until the embargo period has expired, while information (metadata) about the publication and the related data will be made available at the same time as the publication, regardless the imposition of an embargo.

Open data and results produced within the IgnitePLASMA project will be deposited in respective repositories (see paragraph 3.2.2 for details) such that they are usable by third parties after the end of the project. If confidentiality, security, personal data protection obligations, or IPR issues related to specific research data is required, the data may be deposited in a restricted repository and access may be granted upon request, and under the conditions of a restricted license (see also 3.2.2). In addition, quality assurance concerning the accuracy and completeness of the research outputs (i.e., data and metadata) will be performed by the data managers mentioned in subsection 4.4 below, and according to the quality control procedures described in the deliverable report D5.1 (*Quality manual: Procedures to releasing results/issuing reports, questionnaires for the various events/training to ensure quality control*).

Finally, regarding the length of time for which the IgnitePLASMA data will remain re-usable this is defined by the lifetime of the repository. Since the bulk of the project outputs (i.e., technical reports, raw / processed laboratory data, simulation data, metadata, etc.) will be deposited in Zenodo and figshare, the retention period will be for at least 10 years since the project start (i.e., until May 2034), whereas the data aggregated at UCY's dedicated server will be retained for exactly 10 years from the project start. It should be noted that both Zenodo's and figshare's default policy is that all content on their servers are safely retained for the lifetime of the repository.

## 4. Additional information about the project data

### 4.1 Allocation of resources

The cost for making IgnitePLASMA's data FAIR is estimated to be zero since deposition of all non-sensitive data will be done in Zenodo and other established repositories for cloud service that have a free version. Thus, archiving of the project data in this repository will be free of charge. However, consortium partner UCY will use their own budget to collect and archive the project data in their own repository.

Each beneficiary (UCY, SU, UP) that leads the corresponding technological work package (WP3, WP2, WP1 respectively) is responsible for curating and accommodating the datasets being FAIR, while the project Coordinator, UCY, will support the coordination and supervision on this matter.

### 4.2 Ethical and legal aspects

There are no ethical or legal issues that we can foresee in the IgnitePLASMA project. The data produced by the laboratory experiments (both at UP and SU) as well as the computer experiments (UCY) require no such special management.

### 4.3 Security and safety of data

There is no personal data generated or shared (internally, externally) that require any compliance to security rules or GDPR compliance in the IgnitePLASMA project.

Each beneficiary (UCY, SU, UP) that leads the corresponding technological work package (WP3, WP2, WP1 respectively) is responsible for keeping an additional copy of their data for data recovery purposes, while ensuring the data are kept safe during for at least the project lifetime. To safeguard long-term preservation of IgnitePLASMA's data, they will be kept in established repositories (see section 3.2), while the computer codes produced by partner UCY will be managed through GitHub.

### 4.4 Responsibilities for the management of project data

In IgnitePLASMA, the data management activities need to be coordinated and monitored both at project and WP level, while the data management is also linked to the dissemination of the project output and activities. Therefore, the following roles and responsibilities can be identified:

The Project Data Manager (T4.2 task leader) is responsible for *(i)* developing the data management plan and policy in cooperation with the project management in WP5 and the technical partners, *(ii)* coordinating the technical realisation in WP1-WP3, *(iii)* monitoring data management activities (both collection and publication) and deadlines and sending reminders to WP data managers, *(iv)* providing support to WP data managers, *(v)* writing and updating the data management plan, and *(vi)* providing solutions for specific issues in accordance with project management.

The WP1-WP3 Data Managers (assigned by the corresponding WP Leaders) are responsible for *(i)* the implementation of the data management policy in their respective WPs, *(ii)* monitoring data management activities and deadlines and sending reminders to partners and the coordinator, *(iii)* asking partners for missing information or clarifications, *(iv)* providing input to the data management plan by analysing and summarising the WP-specific datasets status, *(v)* monitoring that open results (data and software) are deposited in the repository(ies) or a complementary OpenAIRE-compliant repository and sending reminders to partners, *(vi)* monitoring that open results available in OpenAIRE are properly linked with IgnitePLASMA, and *(vii)* contacting the quality assurance and ethics

committee in case of questions and ethical and privacy issues are related to the data.

## 5. Conclusions

The initial DMP report of the IgnitePLASMA project introduces the procedures and policies for the data management, in line with Horizon 2020 open data requirements and guidelines on FAIR (Findable, Accessible, Interoperable and Reusable) data management. This report furthermore summarises the intermediate results of the project and thus provides the first overview on the data that is to be collected, processed or generated. The DMP is a living document and will be updated with new results from the project members, or when the common data management policy needs to be updated.

## 6. Acknowledgement

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