



# SafeNet

**S**afeguarding Biodiversity  
and Carbon-rich Forest  
**N**etworks in Europe

## Deliverable 9.2: SafeNet Preliminary Data Management Plan (DMP)

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## 1. Introduction

SafeNet's overall goal is to support the conservation of biodiversity (BD) and carbon-rich forest ecosystems in the European Union (EU) and its Member States (MS) that face considerable risks due to climate change (CC) and unsustainable land use while being expected to meet societal demand for natural resources and ecosystem services (ESs). SafeNet will achieve its goal by performing cutting-edge analyses of climate impacts on forests and BD, and co-developing management and policy solutions with key stakeholders to provide integrated knowledge and guidance for supporting the conservation, restoration, and management of EU's forests. The scientific objectives of SafeNet are as follows: 1) Develop methods to quantify, monitor and map biodiversity and climate aspects of European forest ecosystems; 2) Predict the impacts of climate change on forest biodiversity, migration and climate refugia of species; 3) Identification and evaluation of forest management approaches to support biodiversity and climate change mitigation; 4) Effective conservation options for safeguarding biodiversity in European forests, while reconciling socio-economic demands for wood and other ecosystem services; 5) Co-create transformative solutions that foster forest ecosystem biodiversity and resilience with forest-based value chain stakeholders, conservationists and policy makers; and 6) Disseminate, communicate project's results to accelerate the uptake of solutions among relevant regional, national and EU stakeholders.

The scientific content of the project is structured in nine work packages:

- WP1: Co-creating innovative policies and conservation measures
- WP2: Monitoring and mapping ecologically valuable and carbon-rich forests in Europe
- WP3: Futures of European forests in a changing climate
- WP4: Socio-economically Sustainable Forest Management (SFM) and conservation
- WP5: Priorities for improving the connectivity and resilience of the forest conservation network
- WP6: Local impacts of conservation and protection strategies
- WP7: Conservation options for primary, old-growth and high-ecological-value forests in Europe
- WP8: Communication, Dissemination and Exploitation of Results
- WP9: provides resources for Project Management & Coordination

### 1.1 Scope and purpose of the data management plan (DMP)

This Deliverable D9.2 Preliminary DMP (Data Management Plan) will be a baseline for the SafeNet DMP living document to be updated over the course of the project and the evolution of project activities. The SafeNet DMP serves as the comprehensive framework for the management of existing and new research data collected, processed, produced, and re-used by the Safeguarding Biodiversity and Carbon-rich Forest Networks in Europe (SafeNet) project funded by the European Union's Horizon Europe research and innovation framework programme.

The SafeNet DMP provides a detailed overview of the data collection and generation processes and further outlines the procedures for ensuring the public accessibility, shareability, and security of the data generated and/or re-used by the project. It is designed to ensure transparency, accountability, and long-term preservation – where applicable – of the data produced and/or re-used by SafeNet. SafeNet follows FAIR (Findable, Accessible, Interoperable, and Reusable principles for its (meta)data. In accordance with an Open-Science strategy, SafeNet is committed to ensuring that all SafeNet research and innovation outcomes, and other project's outputs are made FAIR and open access (OA) by default



throughout the project's duration and beyond. Only in exceptional cases for which it may be necessary to safeguard Intellectual Property Rights (IPR) for beneficiaries, will delays or limitations in OA be considered.

The SafeNet DMP will be regularly reviewed and updated during the project life cycle to reflect any updates and changes in the nature, volume, or management of data generated and/or re-used by the project. The planned updates will produce an Interim DMP (D9.3) and a Final DMP (D9.4) by the end of the project. The project commits to following the FAIR principles and ethics. During the project lifetime, the Coordinator will enforce and monitor that all project outputs are following those principles.

## 2. Data types to be managed in the project

As part of the project, the consortium will manage different types of data with varying degrees of sensitivity to disclosure and terms of use. The five general groups of data that will be managed can be grouped into the following broad categories:

- Public data sources (e.g., national agencies, international initiatives, and research institutes).
- Limited access data sources (e.g., species data acquired from closed repositories that require contracts where the conditions of the use of the data are specified and NFI data).
- Peer-reviewed and non-peer-reviewed literature (e.g., scientific articles, technical reports).
- Model-based data (e.g., modelled forest structures, modelled species distributions, modelled climate).
- User input data (e.g., interviews, questionnaires).
- Personal data: data that relates to an identified or identifiable living individual, or different pieces of information, which combined can lead to the identification of a particular person.

The re-used data is acquired from open access (such as GBif) and closed repositories (e.g., NFI data), while the new data is produced by the project. Both reused and new data are generated to be used in SafeNet WPs. Reused data is often protected and cannot be re-shared or is already published elsewhere. Therefore, SafeNet can only use these data for project's research purposes, as specified in the data request or agreements made with external data repositories (excl. for open data). These data are used in combination of various models to create simulation data, which can be shared outside the project either as datafiles or scripts that can be applied on re-used data if the user organizes an access to data. The total size of the data depends on the final resolution of map products in common data formats. A data summary detailing whether data is new or existing data that will be re-used; purpose of the data generation or re-use as related to the objectives of the project; origin/provenance of the data; type, format, and size of the data; and foreseen utility of the data/outputs of the project, is provided as a Data Summary Table (Table 1).



N°	Dataset/output name	Current contact	Dataset/output description and origin of the data/output	New/existing data/output	WPs/tasks using the data	Purpose	Type	Format	Size	Data/output utility
1	WP2.1_Luke_Species OccurrenceData	Michael Pashkevich - LUKE (michael.pashkevich@luke.fi) ; Mikko Peltoniemi - LUKE (mikko.peltoniemi@luke.fi)	Data repository of pan-European species (or taxon, as not all occurrences are available at species-level) occurrences, abundances or densities and associated metadata. Data were sourced and harmonised from various public/private repositories. Repositories either own the data, or sourced the data from the data owners. Much of these data are not available open access and need to be stored securely on private CSC server (i.e., they should not be published OA over time). Data are accompanied by associated metadata, as provided by the data repositories or original data owners, or as created by Michael Pashkevich for effective use of the data in SafeNet.	Data are previously existing, but modified for SafeNet's purposes (cleaned and wrangled to suit WP2's and others' modelling needs)	WP2.1, WP2.4, WP2.5, WP3.1, WP3.4, WP3.5, WP4.1, WP4.2, WP4.3, WP5.1, WP5.4, WP7.2	Species occurrence, abundance or density data (occurring at sample-level) are inputs for JSDMs (WP2.4, WP3.4), forest expansion scenarios (WP3.1), identification of species migration routes (WP5.1), assessment of forest connectivity (WP5.3), and analysis of assisted tree migration (WP5.4). Outputs of JSDMs based on species occurrence data are inputs for socioeconomic modelling (WP4.1), quantifying the biodiversity value of existing Protected Areas (WP4.2), and reconciled forest management scenarios (WP4.3).	These are measurements of species occurrences. Methods of measurement were diverse, but broadly grouped into human observations or machine observations. Metadata provided by the data repositories or original data owners, or created using remote sensing-derived data.	.txt.gz	This is difficult to estimate, as data collection is still underway. I would estimate around 5 TB.	Data/outputs are sensitive and cannot be made available outside the project. Therefore, outputs of WP2.1 are useful only to SafeNet. However, there are other tasks using the WP2.1 outputs. The outputs of those tasks will be OA. For instance, JSDM predictions from WP2.4 will be OA.
2	WP2.1_Luke_Species TraitsData	Michael Pashkevich - LUKE (michael.pashkevich@luke.fi) ; Mikko Peltoniemi - LUKE (mikko.peltoniemi@luke.fi)	Data repository of taxon-specific traits. Data were sourced and harmonised from various public/private repositories. Repositories either own the data, or sourced the data from the data owners. Data are accompanied by associated metadata, as provided by the data repositories or the original data owners, or as created by Michael Pashkevich for effective use of the data in SafeNet.	Data are previously existing, but modified for SafeNet's purposes (cleaned and wrangled to suit WP2's and others' modelling needs)	WP2.1, WP2.4, WP2.5, WP3.1, WP3.4, WP3.5, WP4.1, WP4.2, WP4.3, WP5.1, WP5.4, WP7.2	Traits data (occurring at taxon-level) are inputs for JSDMs (WP2.4, WP3.4), forest expansion scenarios (WP3.1), identification of species migration routes (WP5.1), assessment of forest connectivity (WP5.3), and analysis of assisted tree migration (WP5.4). Outputs of JSDMs based on species occurrence data are inputs for socioeconomic modelling (WP4.1), quantifying the biodiversity value of existing Protected Areas (WP4.2), and reconciled forest management scenarios (WP4.3).	These are measurements of species traits. Methods of measurement were diverse and differ between traits and taxa. Metadata provided by the data repositories or original data owners.	.txt.gz	This is difficult to estimate, as data collection is still underway. I would estimate around 500 GB.	Data/outputs are sensitive and cannot be made available outside the project. Therefore, outputs of WP2.1 are useful only to SafeNet. However, there are other tasks using the WP2.1 outputs. The outputs of those tasks will be OA. For instance, JSDM predictions from WP2.4 will be OA.
3	WP2.1_Luke_EnvironmentalVariables	Michael Pashkevich - LUKE (michael.pashkevich@luke.fi) ; Mikko Peltoniemi - LUKE (mikko.peltoniemi@luke.fi)	Data repository of environmental covariates. Exact covariates are still to be determined, but will include bioclimatic factors and variables relating to land use and management. Data will be sourced and harmonised from various public/private repositories. Repositories either own the data, or sourced the data from the data owners. Data will be accompanied by associated metadata, as provided by the data repositories or the original data owners, or as created by Michael Pashkevich for effective use of the data in SafeNet.	Data are previously existing, but modified for SafeNet's purposes (cleaned and wrangled to suit WP2's and others' modelling needs)	WP2.1, WP2.4, WP2.5, WP3.1, WP3.4, WP3.5, WP4.1, WP4.2, WP4.3, WP5.1, WP5.4, WP7.2	Species occurrence data (occurring at sample-level) are inputs for JSDMs (WP2.4, WP3.4), forest expansion scenarios (WP3.1), identification of species migration routes (WP5.1), assessment of forest connectivity (WP5.3), and analysis of assisted tree migration (WP5.4). Outputs of JSDMs based on species occurrence data are inputs for socioeconomic modelling (WP4.1), quantifying the biodiversity value of existing Protected Areas (WP4.2), and reconciled forest management scenarios (WP4.3).	These are measurements of bioclimatic variables, land use, and land management, including under current and future scenarios. Methods to generate these data were diverse. Metadata provided by the data repositories or original data owners.	.txt.gz, GeoTIFF, WMS, .mdb --> potentially others, as final list of environmental covariates is yet to be determined.	This is difficult to estimate, but I would assume several terabytes.	Data/outputs are sensitive and cannot be made available outside the project. Therefore, outputs of WP2.1 are useful only to SafeNet. However, there are other tasks using the WP2.1 outputs. The outputs of those tasks will be OA. For instance, JSDM predictions from WP2.4 will be OA.
4	WP5.4_Luke_Simulation output for genetic diversity and assisted migration/assisted gene flow	Jan Peter George (jan-peter.george@luke.fi)	Computational output from continuous space models for European tree species. The simulation will take various input parameters such as genetic structure, spatial connectivity and gene flow resistance and land use maps. Origin of the data comes from tasks 5.1 to 5.3 and various other publicly available data repositories. Data from previous ongoing Horizon projects (Forgenius and OptForest) at a time when these datasets are released as OA.	New output	WP5.1, WP5.2, WP5.3	The purpose of the dataset is to inform about future possibility and direction of assisted tree migration (man-made and natural) to enable adaptation of tree populations.	The simulation results will be stored in .slim files and will be converted into spatial maps. Several map layers will be conceivable, such as gridded adaptation potential, seed/pollen deployment zones and gene flow direction(s)	.slim/.tiff	>1GB, but this will depend on the final set of species, case studies, etc.	All files will be made OA. While the .slim files will have mainly value for research, spatial maps will be used for decision-support tools and stakeholder meetings. These maps will inform about future use of seed sources for re-planting, forest restoration, and increasing resilience (mainly used in buffer zones around CBRF).



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5	WP7.2_Luke_Synthes is_of_the _outcomes_of_scar io_simulations_for _safeguarding__BD_ mitigation_and_livelyh oods	Anna Repo -Luke (anna.repo@luke.fi.), Mikko Peltoniemi (mikko.peltoniemi@luke.fi), Jukka Forsman jukka.forsman@luke.fi)	Simulation outputs from scenarios and management strategies run in WP3, 4 and 5.	New output	WP1, 8	The data is used to assess trade-offs and propose win-wins for optimally targetted protection and forest management in a changing climate at regional and European scale	Simulation and scenario analysis including maps and graphs	GeoTIFF, .csv and other machine readable files	Several terabytes	The compiled data can be used in consecutive studies related to the topics of SafeNet.
6	WP7.3_Luke_Roadm ap_for_conserving biodiversity_and carbon-rich forests in Europe	Anna Repo -Luke (anna.repo@luke.fi.), Mikko Peltoniemi (mikko.peltoniemi@luke.fi), Jukka Forsman jukka.forsman@luke.fi)	Synthetic materials (see also item 5) of a written report, which cannot be embedded directly in the pdf	New output	WP1, 8	The report consolidates key results into a policy-relevant report to support the implemetation of of current and new policies.	Written report with visualizations	.pdf	1 MB	The report highlight the key results of the project and support the implemetation of of current and new policies.
7	WP6.1_Luke_Landsc ape_model_forest_si mulation_frameworks	Katharina Albrich - Luke (katharina.albrich@luke.fi), Juha Honkaniemi (juha.honkaniemi@luke.fi)	Operational simulation model configuration for the four case study areas, including all necessary input data and parameter configurations	Partially existing (Berchtesgaden CS), partially new (Evo, Brasov, Serra Moreno CS)	WP6.1, WP6.2	The simulation modelling framework will be used in Tasks 6.2 and 6.3 to produce simulation model outputs for further analysis.	Databases, geodata and script files defining the set-up of a simulation landscape; including climate, soil, vegetation and management information	.sqlite, asc., .csv, .js, .xml,	~ 20 GB	The simulation model landscapes can be used for different simulation experiments in the future
8	WP6.1_Luke_Model_ outputs_baseline_ma nagement	Katharina Albrich - Luke (katharina.albrich@luke.fi), Juha Honkaniemi (juha.honkaniemi@luke.fi)	Simulation model outputs of the baseline (business as usual) management for all four case studies	New output	WP6.2	Simulation model outputs will be used to quantify the current resilience of POGF and HCV forests in the CS areas	Databases, one database per model run	.sqlite	Not yet clear, in the range of several TB	Outputs could be analyzed for other research questions, but variables will be specified for analysis needs of SafeNet
9	WP6.2_Luke_Model_ outputs_baseline_ma nagement	Katharina Albrich - Luke (katharina.albrich@luke.fi), Juha Honkaniemi (juha.honkaniemi@luke.fi)	Simulation model outputs with results of the adaptive and mitigative management strategies co-designed with stakeholders	New output	WP6.3	Simulation model outputs will be used to quantify the impacts of the co-designed management alternatives and optimize landscape-level management	Databases, one database per model run	.sqlite	Not yet clear, in the range of several TB	Outputs could be analyzed for other research questions, but variables will be specified for analysis needs of SafeNet
10	WP2.3_TUM_map_for ests_without_anthrop ogenic_disturbances	<a href="mailto:cornelius.senf@tum.de">Cornelius Senf - TUM (cornelius.senf@tum.de)</a>	Map of forests without anthropogenic disturbances in recent past	New output	W2.3	Identifying forests without antropogenic disturbances in at least four deaces for identifying potential future high conservation value forests	Dataset, geodata	.tiff	~50GB	
11	WP2.4_JYU_map_cur rent_predictions_of_s pecies_distributions	Mira Kajanus - JYU (mira.h.kajanus@jyu.fi)	Map of current predictions of species distributions	New output	WP3, WP4	To identify current biodiversity and old growth forests	Dataset	.csv, tiff	Not yet clear	Outputs could be analyzed for other research questions, but variables will be specified for analysis needs of SafeNet
11	WP3.4_JYU_map_fut ure_predictions_of_s pecies_distributions	Mira Kajanus - JYU (mira.h.kajanus@jyu.fi)	Map of future predictions of species distributions under different forest management and climate scenarios	New output	WP3, WP4	To identify future biodiversity and potential old growth forests under different forest management and climate scenarios	Dataset	.csv, tiff	Not yet clear	Outputs could be analyzed for other research questions, but variables will be specified for analysis needs of SafeNet

Table 1. Types of data collected in SafeNet, their origin, description, use by the project, responsible researchers for curation, as well as estimated size and utility.



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### 3. FAIR data

#### 3.1. Making data findable, including provisions for metadata

The data produced and used in the project will either be sensitive or public. Both types of data will be identifiable and locatable by standard identification mechanisms; however, sensitive data will not be available to any third parties. As an example, the original species presence raw data requested and obtained from various institutions, projects and organizations data will remain restricted to the project partners and is not publicly available. Some of the data may have even more limited access, user rights granted only for a specific study outlined in the original data request to or agreement with others (e.g. data repository for multi-taxa biodiversity). After publication, in cases where it is possible, sensitive data will be anonymized according to best practice and shared in open access through the right data repositories.

Zenodo will be used for primary repository of open data sets, research software, reports, deliverables, and any other research related digital artifacts. Any data and/or publications etc. stored in some other trusted repository or services (including any digital platform) will be linked to the project's Zenodo community (<https://zenodo.org/communities/safenet/>) for easy overview and access. Data and metadata information will be readily available to global research and non-research communities, ensuring easy findability. Deposition of data will be commenced as soon as possible following data production/generation or once adequate processing and quality control have been completed, adding value and context to the data and this will be done no later than the end of the project. In exceptional cases in which specific constraints or restrictions are in place (e.g. security rules), data deposition might be delayed beyond the end of the project. Data underpinning a scientific publication will be deposited at the latest at the time of publication, or in accordance with standard community practices.

#### 3.1. Making data findable, including provisions for metadata

Our data and metadata will be assigned a globally unique and persistent digital object identifier (DOI) and registered or indexed in a searchable resource. We will use only trusted repositories which offer persistent identifiers; e.g., published scripts and datasets in Zenodo will be identified by DOI. When needed and possible, we will use Git repository in combination with Zenodo to store, freeze, and publish the final code versions, and to obtain a persistent identifier. Basic metadata will be generated in Zenodo and in other trusted repositories to enable data discovery as different methods and materials for different work packages (WPs) are determined, finalized, and implemented. Where necessary, detailed dataset level disciplinary-based metadata will be created. In Zenodo (and other trusted repositories, if needed), to optimize data findability, discoverability, and reusability, data will be described with rich, harvestable, and indexable metadata, including searchable keywords and data identifiers, following metadata standards such as DataCite Metadata Schema.

The metadata will be documented according to organisational guidelines and available standards, to allow for reuse of data. The study level metadata of the data collected at Luke will be described by CSC's (Finnish IT Center for Science) national services Qvain or Justus research metadata tool, giving metadata a Persistent Identifier. After metadata description anyone can discover, access and in some cases download research data through CSC's Etsin service or Research.fi -service. CSC's services are based on machine readability and use of APIs.



### Metadata description template

<b>Title of dataset</b>	
<b>DOI</b>	
<b>Resource type (publication, poster, presentation, dataset, image, software, workflow, other)</b>	
<b>Publication date (YYYY-MM-DD)</b>	
<b>Project name</b>	
<b>Creator(s) (family name, given name)</b>	
<b>Creator(s) affiliation (institution)</b>	
Data owner (institution)	
Involved researchers (collecting or using the data)	
<b>Description of dataset</b>	Brief description
Where the data can be accessed (link to repository)	
<b>Access rights (open, embargoed, restricted, closed)</b>	
<b>License type (e.g. Creative Commons license, link to license)</b>	
Data collection procedure (e.g. link to protocol, survey, workflow)	
Variable names and descriptions	
Change log (description of changes from previous versions)	
	<i>(Extend as appropriate)</i>

### 3.2. Making data accessible

SafeNet follows open science policies, and data produced in the project will be made available to the scientific community and wider society. However, data is not being shared if potential commercial exploitation, protection of IPR, privacy policies, or any legislation requires closing the data. The right of the data producer (members of the research team) to the use of research data is reserved when providing Open Access (OA). “Right to use” here refers to the right of the data producer to execute the original project plan before releasing data for further use. The Consortium Agreement will outline the access rights of consortium participants to data held by other consortium members and any ownership issues of data.

Project partners will store the data, associated metadata, documentation and code either in publicly available standard data repositories, such as Zenodo or a Git repository, or in their own repositories, such as Luke’s Open data service (<https://opendata.luke.fi/>), and via the CSC IT Center for Science. Luke’s Open Data service is connected to CSC’s repositories and data can be found via Luke’s service or CSC’s Etsin service. Throughout the lifetime of the project, appropriate arrangements with the identified repository will be explored as required. Zenodo provides a DOI for data sets and other digital objects and is also responsible for resolving these DOIs. The documented research data collected in Luke will be preserved permanently in cooperation with the National Archives of Finland. Other repositories are used for long-term preservation and sharing when possible. If needed, Luke’s Research support services will assist in data management, storing and data opening.



Zenodo metadata are publicly accessible and licensed under the public domain. Zenodo metadata of each record is automatically indexed and searchable directly in Zenodo's search engine immediately after publishing. The metadata of each record is sent to DataCite servers during DOI registration and indexed. No authorization will be necessary to retrieve the metadata; however, the protocol of Zenodo allows for an authentication and authorization procedure, where necessary.

Zenodo items will be retained for the lifetime of the repository. This is currently the lifetime of the host laboratory CERN, which currently has an experimental programme defined for the next 20 years at least. Zenodo metadata are accessible, even when the data are no longer available.

The dataset may be accessible confidentially upon reasonable request from the corresponding author if there are any restrictions on their use, such as embargoes until the publication of associated scientific manuscript. The Executive Board will evaluate data requests as required.

We will follow the principles of open science as comprehensively, early and widely as possible. SafeNet will aim to use openly accessible and standard data formats e.g., CSV, Excel, ASCII-text, etc, and scripts that can be run with open-source tools. For example, many scripts will be created in R (open software), they are text files, and they produce data following accessible and standard data formats. When necessary, personal data issues and protection of intellectual property (IP) may occasionally delay or limit or restrict data access. GDPR restricts the use of personal data, allowing only anonymous versions can be openly accessible. Further use of the data will be described in the privacy policy, which covers the entire life cycle of the data including information on when the data is destroyed (retention periods, etc.).

### 3.3. Making data interoperable

Data and metadata will be made interoperable by using existing standards and guidelines. Among the data standards we will apply are, for example, comma-separated value files (CSV) for tabular data, netCDF, GML (OpenGIS® Geography Markup Language 2007), GeoJSON (GeoJSON Format Specification 2015), GeoPackages (GPKG) and other similar standards for exchanging geospatial data. For spatial data we will apply the standards specified under the INSPIRE directive. Use of existing standards and guidelines regarding vocabularies for all data types present in SafeNet data sets will be used as far as possible to maximize interdisciplinary interoperability. Zenodo uses JSON Schema as internal representation of metadata and offers export to other popular formats such as Dublin Core or MARCXML. For certain terms Zenodo refers to open, external vocabularies, e.g.: license (Open Definition), funders (FundRef) and grants (OpenAIRE).

If we will use or generate project-specific ontologies or vocabularies, we will provide mappings to commonly used ontologies and openly publish them to facilitate reuse, refinement, and extension. Our data and metadata will include references to other data and metadata when applicable. Each referenced external piece of Zenodo metadata is qualified by a resolvable URL.

### 3.4. Increasing data re-use

The objective of the project is to guarantee open access as feasible and widely during and beyond the project's duration, acknowledging the limits of the GDPR and other legislation



concerning human participants, and possible protection and/or exploitation of their interests. Later at various stages of the project, data quality assurance processes will be clarified, and they will be included in updated versions of the DMP as required. Data quality and integrity for WPs will be addressed in future planning meetings.

In general, metadata and data will be made freely available in the public domain to permit the widest re-use possible. They will be released with a clear and accessible Creative Commons data usage license: By default SafeNet recommends CC BY 4.0 (attribution) for open data (allows others to distribute, remix, adapt, and build upon data, incl. commercially, and requires crediting the original creator); and CC0 (no rights reserved) for metadata, according to the Grant Agreement (allows others to freely build upon, enhance and reuse data for any purpose, without restriction under copyright or database law). In justified cases, more restricted licences like CC BY 4.0 NC can be applied.

Some data will be restricted and kept within the project during and after the project, unless opening is approved or released by EB (see D9.1 Project Manual). Sole rights for exploitation of the restricted data will be retained by the respective partners that created the data. In instances where other partners in the project require access the data to execute tasks specified in the GA, the access is granted for the other partners.

Documentation needed to validate data analysis and facilitate data reuse (e.g. measurement instructions, laboratory books, readme files with information on methodology, codebooks, data cleaning, analyses, variable definitions and units of measurement) will be provided with the data files, including a comprehensive set of accurate and relevant attributes, with detailed provenance information. SafeNet enforces including an updated metadata for all uploads. It will adhere to domain-relevant community standards to ensure transparency, traceability, and reusability.

To ensure data accuracy, integrity, and reliability throughout its life cycle, the project will implement comprehensive data quality assurance measures. Detailed data collection and management instructions will be established and followed. Training sessions will be organized for project members to ensure consistency and adherence to best practices. In all data conversions, transformations, and transfers, the original information content will be preserved and verified. Formal version control processes will be enforced to track changes and maintain consistency. This will include structured file naming conventions and documented workflows. Where applicable, version control systems, such as Git repositories, will be used to track changes and ensure reproducibility. By implementing these measures, we will minimize the risks related to data handling errors, conversion issues, and processing inaccuracies, ensuring that the data remains accurate, traceable, and reusable.

## 4. Other research outputs

The SafeNet project will manage other research outputs (e.g. formulations, protocols, models, software, practice abstracts, policy briefs) according to FAIR principles. We will follow the rules of the consortium agreement and once we have a more thorough understanding we will describe our procedures in more detail.



## 5. Allocation of resources

Luke is responsible for coordinating the overall data management. The lead contact at each participating organization will be responsible for coordinating the data management in the organization in question including the collection and transfer of data from its own research activities, within the framework of the DMP. The coordinator and the lead contacts at participant organizations will collaborate with involved data and other experts when needed. The coordinator is responsible for that SafeNet's research outputs are in line with the FAIR data principles, and that every consortium partner has also committed to the FAIR principles. The costs will be covered during the project by the Horizon Europe grant during the duration of the project and by partner institutions after the project's conclusion. Open access and costs associated with making data FAIR will be paid from the respective partner's budget.

Data management planning is the responsibility of the coordinator of the project. The lead contact at each participant organisation will be responsible for the collection and transfer of data from its own research activities, within the framework of the DMP. Partners will be responsible for uploading the dataset information in the EU Funding and Tender Opportunities Portal. Luke as the coordinator will supervise the process. Partner can upload data into Zenodo or other services only with the consent of Executive Board if it contains contributions from other partners or if it will be used by another partner for the project's purposes during its lifetime.

After the end of the project, project partners are responsible of curating and preserving their raw data. The long-term preservation practises of partners will be defined later in the project. Decisions on which data to retain and for how long will be based on scientific, legal, and institutional policies, ensuring accessibility and reusability over time; e.g., the documented long-term value research data collected in Luke will be preserved in cooperation with the National Archives of Finland or CSC (Finnish IT Center for Science). The costs for long term preservation of data will be clarified at various stages later in the project. For the foreseeable future, Zenodo is free to all, funded by the EU, and is expected to be available for the long term.

The DMP and Consortium Agreement (CA) outline the access rights of the consortium participants to data held by other consortium members and relevant ownership of data. The DMP and CA also identify responsibilities regarding the use of data during project lifetime as well as issues related to the long-term storage and maintenance and/or destruction of data after the project has been completed. Special attention will be paid to comply with EU's General Data Protection Regulation (GDPR).

## 6. Data security

The GDPR (Regulation (EU) 2016/679 - General Data Protection Regulation) lays down rules for the protection of natural persons with regard to the processing of personal data and the free movement of personal data and protects fundamental rights to the protection of personal data. GDPR also aims to empower citizens in decision-making with regard to the use of their personal data. In SafeNet, the GDPR guarantees that the personal data will be managed within the project by ensuring its high level of the protection (GDPR, 2016).

According to the European Commission (EC), GDPR defines personal data as to any information related to an identifiable living person, including different pieces of information



that, when combined, can identify someone. De-identified, encrypted, or pseudonymized data that can be used to re-identify a person is also considered personal data under GDPR. Data that has been irreversibly anonymized, making the individual unidentifiable, is not considered personal data. GDPR safeguards personal data regardless of processing technology or storage method, whether it's automated or manual, in an IT system, through video surveillance, or on paper.

Collected and generated data will be primarily stored in MS Teams at Luke, SafeNet's secure team folders at CSC HPC environment and on the secure servers of project partners, which host computer intensive calculations executed in the project. Access will be restricted to authorized users through user IDs and passwords. If the project requires sharing or analyzing personal or sensitive data, even more secure and restricted services will be used. Partner organizations will ensure data backup and recovery by following their internal policies. Additionally, each partner has a designated Data Protection Officer (DPO) to provide guidance on data security and GDPR compliance.

Luke's MS Teams environment operates under a Valtori (Government ICT Centre of Finland) agreement, which includes specific arrangements with Microsoft to enhance data security and privacy (All organizations using Teams may not have similar arrangements in place). A dedicated workspace with more restricted access can be created in Teams for data that requires additional protection.

The long-term preservation strategy will be defined later in the project. Zenodo items will be retained for the lifetime of the repository, which currently aligns with CERN's experimental program, planned for at least 20 years. Data with long-term value and metadata owned by Luke will be curated and preserved long-term or permanently in collaboration with the National Archives of Finland or CSC (Finnish IT Center for Science).

## 7. Ethics

The main principle in human studies (workshops and focus group discussions) is that participation in project's activities is voluntary and based on informed consent. The project's Informed Consent Form will be translated to local languages using terms intelligible to participants. During studies the respondent can choose not to participate and can withdraw at any stage of the study without being penalized or disadvantaged. Informed consent is also asked for collecting and processing of personal data.

Partners are committed to process personal data in accordance with General Data Protection Regulations (GDPR) 2016/679. Partners organizing workshops and focus group discussions (ESSRG, Luke, FSC, TUM, TUD, UniTBv, UPM, NMBU, ERINN) have appointed a Data Protection Officer who looks after GDPR matters in general and is available to guide researchers for data privacy issues. Partners will follow their internal protocols and apply a permission for their activities involving humans, when needed and before starting workshops and focus group discussions.

The workshops will be organised for the different case study sites with local and regional stakeholders as Living Lab participants, including only adults. We collect data on (1) current cultural values and local livelihoods that relate to forests, (2) perceptions of societal desirability, acceptability and economic and technical feasibility of potential forest management, and on (3) pathways of change that might mitigate disruption to enable and



enhance equitable changes in forest use and management. No sensitive personal data will be collected.

Data from workshops and focus group discussions is confidential and respondents cannot be identified in the reports. Collected data is relevant and limited only for project's purposes. Data will be protected against unauthorised use. Each organizing partner is a data controller and responsible for its processors and agreements related to data processing activities in their county.

In the Communication, Dissemination and Exploitation of Results (CDE) work package, activities include stakeholder visits to case study sites, participation in SafeNet events and dissemination of results through workshops. Personal data collected for communication purposes includes contact information like name, email address, organisation and participant's role in the organization. This data will be stored safely in files with restricted access by the partner arranging the activity.

Two project partners come from the United Kingdom and Norway. Data transfer will be covered by legal collaboration agreements which include GDPR provisions as per EU requirements. No materials will be transported from EU to non-EU countries or vice versa.

Use of artificial intelligence, as per a 2018 EC High Level Expert Group definition, will be limited to very narrow, goal-directed AI, without the capacity to adapt their own behaviour. As such, these present the lowest risks of unintended or unexplainable behaviour. AI methods will be developed and implemented for predicting species identifications from audio recordings and camera-trap images and identifying continuity forests from satellite and aerial images. The audio data has potential legal issues related to eavesdropping: the possibility of recording conversations of individuals without them knowing that recording is going on. To avoid this, we will provide information in the field about the ongoing recordings, as we have done in our ongoing projects that also utilize autonomous recording. While audio data will in principle be fully openly available, in case of sensitive recordings the published data may remain restricted due to privacy concerns. The reasons for restricted access will be clearly stated in such cases, and access requests will be considered based on ethical and legal considerations (e.g., GDPR). Technical robustness and reproducibility are guaranteed by documentation of the codes and their dependencies allowing reproducibility of results. Model reliability and accuracy is ensured by calibrating them with data labelled by human experts. The use of the models cannot result in any harm to humans. All human sounds and images will be removed from the data by the models. The models produce reliable, high-quality and comparable data.

## 8. Other issues

The DMP will ensure that data management and protection is compliant with EU principles and standards, and with relevant national data protection laws and institutional data management policies. Produced data will be treated according to the management guidelines and then implemented through relevant WPs.

The SafeNet consortium is committed to ethical research and to the principles described in the Charter of Fundamental Rights of the EU, the European Convention on Human Rights, and its supplementary Charter of Fundamental Rights of the European Union in Practice, as well as in pioneering documents (incl. Nuremberg Code, Declaration of Helsinki), and will carry out its activities according to standard procedures as advised by the EC. More specifically,



SafeNet will be subject to the European Code of Conduct for Research Integrity, as well as ethical standards in force by its academic and practice partners. In case no ethical standards are yet in force, project activities will be subject to the ethical standards set by the Finnish Advisory Board on Research Integrity (TENK, [www.tenk.fi/en](http://www.tenk.fi/en)), to which the coordinating institute Luke has committed.

The coordinator Luke has signed the national Declaration for open science and research 2020-2025 in Finland, which means that Luke is committed to: 1. endorsing the strategic goals for open science and research defined by the research community, 2. supporting and encouraging the everyday work to attain the objectives and goals of the policies and 3. actively participating in the national open science and research coordination activities. The consortium partners will be encouraged to contribute to the same commitment from their corresponding field of action.

The DMP is considered a living document and is subject to updates whenever significant changes arise and over time with periodic project evaluations. The next DMP is scheduled for M23 of the project.





# SafeNet

**Safe**guarding Biodiversity  
and Carbon-rich Forest  
**Net**works in Europe

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