



# forest 4.0

**CENTRE OF EXCELLENCE: FOREST 4.0**

**D7.1: Data Management plan**

**WP7: Project Management**

**Version I**

Responsible Author: Tomas Krilavičius (VMU) and Eglė Gerulaitienė (VMU)

## Document information

<b>Grant Agreement No.</b>	101059985
<b>Project Acronym</b>	Forest 4.0
<b>Project Title</b>	Creation of the centre of excellence in smart forestry
<b>Type of action</b>	HORIZON Coordination and Support Actions
<b>Horizon Europe Call Topic</b>	HORIZON-WIDERA-2022-ACCESS-01-01-two-stage
<b>Start – ending date   Project Duration</b>	1 May 2023 – 30 April 2029   72 months
<b>Project Website</b>	<a href="http://www.Forest40.lt">www.Forest40.lt</a>
<b>EU Project Advisor</b>	Doru-Leonard IRIMIE
<b>Project Coordinator</b>	Vytauto Didžiojo Universitetas (VMU)
<b>Address</b>	K. Donelaičio g. 58, Kaunas LT-44248, Lithuania,
<b>Contact   Email</b>	Tomas Krilavičius   <a href="mailto:tomas.krilavicius@vdu.lt">tomas.krilavicius@vdu.lt</a>
<b>Work Package</b>	WP7: Project Management
<b>WP Lead Beneficiary</b>	VMU
<b>Relevant Task(s)</b>	T7.1
<b>Relevant Deliverable</b>	D7.1: Data Management plan
<b>Relevant Milestone</b>	Milestone 4: Approved Data Management Plan
<b>Deliverable Lead Beneficiary</b>	VMU
<b>Responsible Author</b>	Tomas Krilavičius (VMU) and Eglė Gerulaitienė (VMU)

Document History

Version	Changes	Date	Contributor
01	The first version of the document	13/09/2023	Eglė Gerulaitienė (VMU)
02	Structural updates and comments	20/09/2023	Tomas Krilavičius and Gintautas Mozgeris (VMU)
03	Structural updates and comments	22/09/2023	Rytis Maskeliūnas (KTU)
04	Updated version of the document	12/10/2023	Arianit Kurti (LNU)
05	<b>Final Version presented</b>	20/10/2023	All partners

## Table of Contents

### Contents

<b>Document information</b> .....	<b>2</b>
<b>Document History</b> .....	<b>3</b>
<b><i>Executive summary</i></b> .....	<b>5</b>
<b>1. Introduction</b> .....	<b>5</b>
1.1. Data Summary .....	5
<b>2. FAIR data</b> .....	<b>12</b>
2.1. Making data findable, including provisions for metadata .....	12
2.2. Making data accessible .....	13
2.3. Making data interoperable .....	16
2.4. Increase data re-use .....	16
<b>3. Other research outputs</b> .....	<b>16</b>
<b>4. Allocation of resources</b> .....	<b>17</b>
<b>5. Data security</b> .....	<b>17</b>
<b>6. Ethics</b> .....	<b>18</b>

## Executive summary

Forest 4.0 Data Management plan was prepared according to the Horizon Europe Model Grant Agreement requirements, that a data management plan ('DMP') should be established and regularly updated. The use of the DMP template is used as recommended for Horizon Europe beneficiaries.

## 1. Introduction

### 1.1. Data Summary

The overall objective of the FOREST 4.0 project is to establish a Centre of Excellence to transform the forest environment monitoring, data acquisition, and analysis, and capture value from the collected data.

Forest 4.0 will focus its research and innovation activities on Smart, chain and bioeconomy driven Forest applications, especially in ICT-based technologies (AI and IoT) according to the following strategic Research Innovation topics defined by the consortium:

- IoT remote sensing and ubiquitous computing for the development of geospatial techniques;
- IoT monitoring and AI prediction techniques for the development of forest management system and the detection of forest threats
- Crowdsourced forest-based data management and visualization;
- AI techniques for cognitive sensing and multi-modal signals processing in IoT-based systems for predictive analytics;
- Development of Decision Support Tools (DSTs) to assess forest management practice;
- Life Cycle Assessment (LCA) and bioeconomic modelling tools for the identification and justification of sustainable forest-based business model innovations.

These Strategic research and innovation topics are in-line with three of the six S3 for Lithuania.

Project proposed 4 specific objectives, which are associated with the inter-connected Work Packages (WPs). The research WP 4 is aligned with the specific objective 2:

### **Specific objective 2: conduct research on AI-IoT methods and capabilities for the development of sustainable forest-based research applications**

- Implement a research strategy on AI and IoT with the CoE research teams.

- Develop an AI defined data infrastructure that would help researchers and students **across different scientific disciplines** (such as computer science, forestry, environmental science, economics) to create value out of the data. These data infrastructures will help to support AI-related technologies and applications to achieve sustainable data openness for research, monitoring, policymaking based on forest information.
- Investigate and model sustainable smart forestry practices based on prescriptive optimisation modelling adapted to the entire supply-chain logic. The CoE will cover multidimensional forest sectors, ranging from activities aimed to understand tree eco-physiological processes and, thus, to build a scientific frame of smart forestry; development and introduction of advanced silvicultural and forest management methods and reaching but not ending with the value chain; logistical aspects; technologies for processing of timber and other forest products. The CoE will mostly perform applied research thus at least one innovation in a form a demonstrator and/or new business opportunity that increases the research valorisation will be produced annually. These research valorisation possibilities will be linked with other bioeconomy sectors and strengthen participation-driven adaptive forest management.
- Develop a Forest-related Innovation Start up Incubator harnessing the entrepreneurial potential of Lithuania by providing access to infrastructure, mentoring, and providing support services during this critical phase. The objective is to facilitate the generation of new data driven business opportunities.

The data management of the Forest 4.0 project reflects the overall and specific project objectives, as presented in the table below:

WP No	Tasks	Research description/objectives	Methods of primary data collection
WP4	IoT remote sensing and ubiquitous computing for the development of geospatial techniques	Using IOT forest: environmental management, natural resources management, disaster management, land information system management and visualization, Forest IoT network security, IoT based soft computing- multiagent systems risk evaluation and decision support systems with XAI(explainable AI), creation forest IOT services, capturing information on forest resources for forest estates, landscapes, regions or countries utilizing new finer-	Data collected by sensors networks and IoT devices; remotely sensed data, including data from own missions and acquired from data repositories; data from Lithuanian and international geospatial

		<p>resolution data sources and developing new data capture/storage/processing concepts, developing new precision silviculture methods by utilising finest resolution 3D tree level data, advanced frameworks of natural resource inventories based on IoT and remote sensing, exploring spectral properties of vegetation to develop geospatial techniques for climate smart forestry</p>	<p>infrastructure; field surveying and other measurement data;</p>
	<p>IoT monitoring and AI prediction techniques for the development of forest management system and the detection of forest threats</p>	<p>Research topics: eco-physiological processes in forest ecosystems and aimed to build scientific frame of smart forestry (e.g. changes in tree transpiration and fluorescence, photosynthetic activity, development of tree annual rings, together with precise recording of environmental conditions); greenhouse gases over the forest canopies to detect the tree response to environment changes and define the resistance and resilience limits; improvement of models for greenhouse gases and CO<sub>2</sub> footprint; processes in forest soils; forest productivity; decomposition of organic matter; forest vegetation under stress conditions; modelling natural hazards and forest disturbances for decision support; interactions between vegetation and CO<sub>2</sub>, O<sub>3</sub> and N regimes under progressive climate warming and associated feedbacks; fundamentals of precision forestry</p>	<p>GHG, environmental, process-based eco-physiological data of forest ecosystems surveyed using installed equipment;</p>
	<p>Crowdsourced forest-based data management and visualization</p>	<p>Research topics: data and metadata storage infrastructure, exploratory data visualization for early investigation and decision making, anomaly maps for problematic locations detection, anomaly detection for predictive maintenance,</p>	<p>1) visual exploratory analytics solutions 2) anomaly maps for early problematic locations identification</p>

		optimization of forestry-related logistic processes	3) optimization of forestry-related logistics 4) anomaly detection for predictive maintenance 5) forestry data simulation
AI techniques for cognitive sensing and multi-modal signals processing in IoT-based systems for predictive analytics		Potential research topics: a) Analysis of multimodal forest data (using a fusion of any available data: computer vision, spectrum sensing, tree sensor data, etc.) for b) Intelligent predictive production and maintenance (forest "health care," (re)growth, carbon, fire alerts, and so on). c) Modeling and forecasting of biomass supply chains as a dynamic combination of organizations, human resources, activities, information, and biomass resources (bulk residues, chips, bundles) involved in transferring trackable residues from suppliers to end-users. d) AI-powered cognitive task analysis to foresee the aims of explicating forest user demands, desires, and cognitive capacities for coping with complicated forest bio-economy chain systems. e) Metaheuristics	Conceptual framework(s) for self-services such as: a) AI-driven identification and prediction of forest production and maintenance requirements. b) AI-driven forest "impact" driver reports, automated analysis and evaluation of the effects of external factors; c) Modeling and forecasting of biomass supply chains.
Development of Decision Support Tools (DSTs) to assess forest management practice		Potential research topics: models for strategic and tactical coordination of precision silvicultural methods with the value chain; development and implementation of modern decision support tools for experimenting with alternative forest management models; methods to account for diversity of ecosystem services in decision support for sustainable forestry; incorporation of global climate change and market scenarios	Forest resource data from forest inventories and forestry registers; data specifying the forest management programs; industrial process data; data on industry locations and capacities;

		in forest management; consideration of climate change effects in forest management decisions; landscape-scale decision support; decision support to account for greenhouse gases in agriculture, forestry and land use sector; new and modified silvicultural management methods devised; social, technological, ecological, economic and political aspects of precision forestry operationalization	forest product marked data; climate scenario data; GHG inventory data
	Life Cycle Assessment (LCA) and bioeconomic modelling tools for the identification and justification of sustainable forest-based business model innovations	a) Integration of LCA and bioeconomics for the analysis of products and processes in forest resources-based value chains with the aim to improve both environmental and economic performance; b) Environmental sustainability and economic viability of circular economy models applied in forest resources-based business; c) IoT and AI driven automatization of data acquisition and analysis for the completion of integrated assessments and simulations concerning forest resources-based products and processes; d) Resilient forest value chains under conditions of local and global change, potential consequences of different forest resilience enhancement strategies on the long-term design of value chains, forest and value chain alternatives to enhance the resilience from societal perspectives, institutional adaptations to take advantage of forest and value chain strategies, and road maps for their implementation	Forest-based business enterprises survey data

The envisaged types of data and format of data are presented in the following table:

Example 1: Collection of remote sensing data				
Method of data collection	Building spectral libraries in mobile labs	Airborne hyperspectral imaging	Airborne multispectral imaging	Airborne laser scanning
Method of data analysis	Scanning, reflectance transformations, constructing spectral curves, archiving	Mission planning, airborne hyperspectral imaging, image radiometric and photogrammetric processing	Mission planning, airborne multispectral imaging, image radiometric and photogrammetric processing	Mission planning, airborne laser scanning, postprocessing and point cloud generation and classification
Sample size (if not applicable use N/A)	N/A	N/A	N/A	N/A
Hardware/software for data collection/analysis	VNIR400H and Rikola cameras, ENVI software	Bekas X32 aircraft, Rikola and some SWIR camera, simultaneously with CIR multispectral camera, Enso Mosaic, ENVI or similar software	Bekas X32 manned aircraft or various UAVs, multispectral camera(s), Enso Mosaic, ENVI, Pix4D Mapper	Bekas X32 manned aircraft and/or UAV, AISPECO Sensor controller, Riegl lidar, Applanix software (one option)
Types of data	Spectral library files	Mosaics of hyperspectral images	Orthophotos, georeferenced images, photogrammetric point clouds	3D point clouds
Formats of data (standard/open)	Text	TIFF	TIFF	LAZ/LAS
Estimated size of data (approx. ...MB/GB/TB)	MBs	~100s GB / project	~10s GB / project	Up to TBs per project

Example 2: Monitoring of GHG emission, meteorological and air chemistry, soil, tree ecophysiological data

Method of data collection	Permanent survey of GHG concentrations and meteorologic data	Mobile survey of GHG emissions and meteorologic data	Survey of eco physiological tree and forest characteristics	Permanent survey of long-term air pollution
Method of data analysis	Data recording, transformation, storage, validation, statistical treatment, modelling	Data collection planning, recording, transformation, storage, validation, statistical treatment, modelling	Data collection planning, recording, transformation, storage, validation, statistical treatment, modelling	Data recording, transformation, storage, validation, statistical treatment, modelling
Sample size (if not applicable use N/A)	N/A	N/A	N/A	N/A
Hardware/software for data collection/analyses	~50 m tower with platform for installation of survey equipment, set of equipment for eddy covariance-based CO <sub>2</sub> , CH <sub>4</sub> and associated meteorological data, supporting software	Mobile platform and set of equipment for CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, NH <sub>4</sub> atmospheric and soil data profiling, supporting software  Automated Atmospheric profiling and Soil CO <sub>2</sub> flux measurement system	Permanent and mobile platform for measurements of photosynthetic intensity, measurements of foliage chlorophyll fluorescence, O <sub>3</sub> concentration, tree sap flow, stem increment, etc. and supporting software	Permanent system for measurement of PM, SO <sub>2</sub> , NO/NO <sub>2</sub> /NO <sub>x</sub> , O <sub>3</sub> , CO, NH <sub>3</sub> and supporting software
Types of data	Data files of measured parameters with metadata	Data files of measured parameters with metadata	Data files of measured parameter with metadata	Data files of measured parameters with metadata

Formats of data (standard/open)	Txt/csv/xls	Txt/csv/xls	Txt/csv/xls	Txt/csv/xls
Estimated size of data (approx. ...MB/GB/TB)	TBs	GBs	GBs	GBs

## 2. FAIR data

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

All datasets will be provided with technical and descriptive metadata, including the author(s), title, format, also funding institution and grant agreement number in case of publications. Naming of the files will be standardized.

All publications will be provided with DOI (technical and descriptive metadata (the author(s), the title, the format; funding institution and grant number in case of publications). The search keywords will be created according to the content of the project (and its datasets), eg. topic, year, country, etc. All versions will be numbered.

The metadata will consist of the data characterizing the current project and its results, and for identification the Dublin Core standard will be used (which is the standard the library of VMU uses). The datasets concerning the codes of ethics will be in the format of Excel tables, pdf and msw files, each of which will get a DOI. The corresponding data will be linked to each publication. The project will develop geo-spatial data sets, which will be described following the standards required by national or international geo-spatial infrastructure, depending on the case.

The consortium will ensure open access to all peer-reviewed scientific publications relating to its results, according to the guidelines set out by the EC and will use the preprint servers of arXiv and the new Open Research Europe platform proposed by the EC. The researchers will link their publications to their ORCID persistent digital identifier.

The CoE might also create a dedicated repository space for project data, and it will contain project's information and partners data and the links to partners' institutional repositories as well as the link of the CoE website in order to simplify the process of archiving. Some data sets developed will be introduced in peer-reviewed, open-access journals for descriptions of datasets, and research that advances the sharing and reuse of scientific data, such as Scientific Data (<https://www.nature.com/sdata/>), Earth System Science Data (<https://www.earth-system-science-data.net/>), assuming that the data itself is made available at public repositories for sharing scientific data (e.g. <https://knowledge.figshare.com/about>).

The acknowledgment of the EC support for all publications and other dissemination relating to the TEAMING project research will be included in all external communications.

The consortium will have a strategy of mixed “gold open access” and “green open access” approach, according to the scope of the published results and with consideration of the IPR issues. On the day of submission to a journal, all scientific publications will be made available publicly and free of charge (“green” open access) on Zenodo and iEEE respecting the requirement of HE programme. The partners are committed to the management of the data generated or collected in the project.

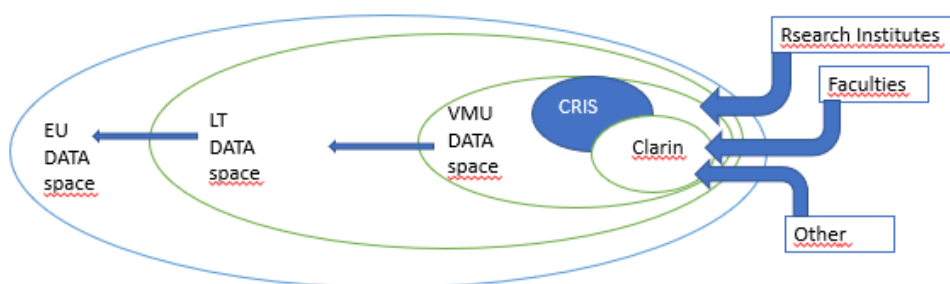
## 2.2. Making data accessible

VMU has established its institutional repository CRIS for science management system, using the most advanced digital technologies for data acquisition, long-term preservation and dissemination. VMU CRIS is based on open source software DSpace/CRIS. It serves as an open access database for the publications produced by VMU researchers. Aggregate-level datasets will be provided with a detailed methodological report outlining the methodology, definitions, operationalisation, and data description for reusability and validation. KTU uses the Lithuanian Academic Electronic Library eLABa - as a national aggregated open access (OA) repository. The main goals of eLABa creation were development of the environment and tools, allowing preparation, collection, long-term preservation, and permitting access to research and study e-documents, created in Lithuania. LNU is using DiVA, which is Linnaeus University's institutional repository and digital archive. DiVA is a repository for both research publications and student theses. Publications registered to DiVA can be found in many external search engines and databases, like SwePub, Google and Google Scholar. Data from DiVA is used to create publication lists at researcher's staff pages at Lnu.se, and as a basis for various evaluations.

All bibliographical data and the Excel database of the bibliography data set (in Excel format) will be openly available. Any peer-reviewed scientific publication made within the context of the project will be available online to any user at no charge.

A part of the data is not openly available, it will be deposited in the protected cloud environment of the Vytautas Magnus University in a Forest 4.0 project folder ("Data/Country name"), which can be accessed only by three responsible scientists of the project. The data if needed will be anonymized and used without identifiable details. Data will be safely stored in the CRIS repository as well as in Microsoft Sharepoint project folder.

The data collection, processing and recording will follow the rules of GDPR and the principles of research integrity - honesty, responsibility, fairness and accountability. The data will be kept in the trusted repository of Sharepoint provided by VMU. More information provided under data security and ethics parts.



The national legal frameworks for data provision in open access:

Consortium partner	Relevant national and organizational laws and regulations	National and institutional data repositories
Lithuania, VMU	<p>The Republic of Lithuania Law on Science and Studies, art 45 (Seimas of the Republic of Lithuania, 2009-05-12, Nr. 54-2140).</p> <p>Resolution of the Lithuanian Science Council on Approval of the Guidelines on Open Access to Scientific Publications and Data (Lithuanian Science Council, 2016).</p> <p>Guidelines for Open Access to Research Publications and Scientific Data 2020 October 1 No. 517 (Rector of Vytautas Magnus University, 2020).</p> <p>Resolution on Approval of the Provisions for Assessing the Conformity of Research with the Basic Principles of Professionalism and Ethics 2021 March 24 No. SEN-N-17 (The Senate Of Vytautas Magnus University, 2021).</p>	<p><a href="https://www.vdu.lt/cris/home">https://www.vdu.lt/cris/home</a></p> <p>Research Management System</p>
KTU, Lithuania	<p>The Republic of Lithuania Law on Science and Studies, art 45 (Seimas of the Republic of Lithuania, 2009-05-12, Nr. 54-2140).</p> <p>Resolution of the Lithuanian Science Council on Approval of the Guidelines on Open Access to Scientific Publications and Data (Lithuanian Science Council, 2016).</p> <p><a href="#">KTU Open Access Guidelines</a>, approved by Order No. A-236 of the Rector of KTU, 13 May 2020</p> <p><a href="#">GUIDELINES FOR THE MANAGEMENT OF OPEN ACCESS RESEARCH AND EXPERIMENTAL (SOCIO-CULTURAL) DEVELOPMENT RESOURCES AND SERVICES AND THEIR PROVISION TO EXTERNAL USERS AT KAUNAS UNIVERSITY OF TECHNOLOGY</a>, approved by Order No. A-406 of the Rector of KTU, 23 September 2020</p>	<p>Lithuanian Academic Electronic Library eLABa - as a national aggregated open access (OA) repository.</p>

	<p><a href="#">Guidelines for the Assessment of Research Ethics at Kaunas University of Technology</a>, approved by Order A-201 of the Rector of KTU, 23 April 2021 (revision of Order No. A-364, 12 October, 2022)</p>	
LNU, Sweden	<p>The Swedish Government Bill 2020/21:60 on “Research, freedom, future – knowledge and innovation for Sweden”  <a href="https://www.regeringen.se/contentassets/da8732af87a14b689658dadcfb2d3777/forskning-frihet-framtid--kunskap-och-innovation-for-sverige.pdf">https://www.regeringen.se/contentassets/da8732af87a14b689658dadcfb2d3777/forskning-frihet-framtid--kunskap-och-innovation-for-sverige.pdf</a></p> <p>Swedish Ethical review authority focusing on ethical review of the research applications and their compliance with national laws and regulations.  <a href="https://etikprovning Smyndigheten.se/en/about-the-authority/">https://etikprovning Smyndigheten.se/en/about-the-authority/</a></p> <p>The Ethical Advisory Board in South East Sweden that is comprises representatives from Linnaeus University, Blekinge Institute of Technology, Region Kalmar county, Region Blekinge and Region Kronoberg. Its mission is to follow the Act concerning Ethical Review of Research Involving Humans (2003:460) contains provisions on the ethical review of research relating to humans and biological material from humans, with the aim of protecting the individual and the respect for human worth in research.  <a href="https://lnu.se/en/meet-linnaeus-university/collaborate-with-us/projects-and-networks/ethical-advisory-board-in-south-east/">https://lnu.se/en/meet-linnaeus-university/collaborate-with-us/projects-and-networks/ethical-advisory-board-in-south-east/</a></p> <p>Local regulations (Dnr: Lnu-2023/132) regulating the handling instructions for research documents.  <a href="https://lnu.se/globalassets/dokument---gemensamma/forskningsstod/hanteringsanvisningar-for-forskningshandlingar.pdf">https://lnu.se/globalassets/dokument---gemensamma/forskningsstod/hanteringsanvisningar-for-forskningshandlingar.pdf</a></p> <p>Local regulations (Dnr. 2021/964-1.1.1) Policy for handling research data at Linnaeus University.  <a href="https://lnu.se/globalassets/dokument---gemensamma/bibliotek/sektion-publicering/policy-for-hantering-av-forskningsdata.pdf">https://lnu.se/globalassets/dokument---gemensamma/bibliotek/sektion-publicering/policy-for-hantering-av-forskningsdata.pdf</a></p>	<p>Swedish National Data Service (SND)  <a href="https://snd.gu.se/en">https://snd.gu.se/en</a></p> <p>SUNET Drive for data storage  <a href="https://sunet.se/">https://sunet.se/</a></p> <p>DiVA - Academic Archive Online  <a href="http://lnu.diva-portal.org/">http://lnu.diva-portal.org/</a></p>

Forest 4.0 will develop datasets for Lithuanian National Forest Inventory (managed by State Forest Service), Statistics Lithuania (managed by State data agency), Environmental monitoring program and GHG inventories and national reporting (managed by

Environment Protection Agency), pan-European ICOS network, etc. The use of such data will be according to the data use policies of involved institutions.

### 2.3. Making data interoperable

The data produced in the project will be interoperable: all the project partners will use the same standards: the same organisation and documentation of the files, same standards of metadata, same licenses. The project will use open data and metadata standards, established sentiment analysis methods, design thinking, gamification and XR etc. using standard vocabularies for the majority of its data types.

### 2.4. Increase data re-use

Project results, incl. the proprietary rights of the data are transferred by the grant holders to the University by an employment contract (academic staff) or another written document (deed of a transfer of intellectual property). The data is published under the Creative Commons license CC-BY 4.0A third party whose data has been used to create the results of the grant may impose restrictions on the use of the data. In this case, these restrictions must be taken into account when licensing the data, i.e. the use of the data can only be licensed to the extent of the rights granted by the third party (i.e. to the extent of the rights acquired by the university from third parties).

Every participating country can decide independently when their data will be made reusable. In general, the data will be made available together with the publication using these data. If more publications are planned on the same data, the data will be publicised together with the last publication using the particular data set. The scientific quality of the data is ensured by experienced scholars who are responsible for the implementation of the project.

The repository created by the co-ordinator (VMU) will guarantee the preservation of the data for 5 years after the end of the grant. Some data will be destroyed within a shorter period (see Data security and Ethical aspects).

## 3. Other research outputs

A research project intending to transform the forest environment monitoring, data acquisition, and analysis, and capture value from the collected data. Forest 4.0 will therefore adhere to the European approach of making data “as open as possible, as closed as necessary” and follow the FAIR Data Management Guidelines to make data “findable, accessible, interoperable and reusable”. Open science practices will be cultivated by a number of measures in all phases of the research process:

- 1) The project website will serve as a first contact point for all stakeholders with an interest in forest environment monitoring, IoT monitoring and AI prediction techniques, crowdsourcing, etc. Forest 4.0 will ensure transparency of the research process by providing key information and regular updates about the project's progress on the website. The website will also be a space for dialogue with interested stakeholders.
- 2) Forest 4.0 will prefer submitting articles to open access journals which have no submission and processing fees; second – using the 'green' model (submitting published articles to the publications' repositories of the partner Universities); third – using the 'gold' model;
- 3) Forest 4.0 involves various relevant actors (researchers and students, Businesses and investors, Policy makers, Citizens) in “conducting research on AI-IoT methods and capabilities for the development of sustainable forest-based research applications” (WP4) and “integration of the developed AI-IoT methods into targeted Lithuanian ICT industries to boost forest data intelligence with AI” (WP5).
- 4) The project's outputs will all be publicly accessible and free to use.

#### 4. Allocation of resources

No storage costs, as participating Universities use their Sharepoint storage space and the other participants will use VMU's Sharepoint. Data management will adhere to the General Data Protection Regulation (GDPR) and will be in compliance with the participants' data management guidelines.

#### 5. Data security

The data collection, processing and recording will follow the rules of GDPR and the principles of research integrity - honesty, responsibility, fairness and accountability.

The data processing activities will ensure the safety of personal data following VMU regulations on data management: [https://www.vdu.lt/wp-content/uploads/2023/05/VDU\\_asmens-duomenu-tvarkymo-taisykles.pdf](https://www.vdu.lt/wp-content/uploads/2023/05/VDU_asmens-duomenu-tvarkymo-taisykles.pdf)

Forest 4.0 takes appropriate technical and organizational measures to protect data against unlawful processing and accidental loss or damage. All data sets produced by the project will be stored on the trusted Sharepoint platform owned by the project coordinator VMU. The transcripts will be archived according to the rules of archiving and

archiving ethics adopted by VMU.

## 6. Ethics

Forest 4.0 will promote good research practices based on fundamental principles of research integrity:

- **Reliability** in ensuring the quality of research, reflected in the design, the methodology, the analysis and the use of resources.
- **Honesty** in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair, full and unbiased way.
- **Respect** for colleagues, research participants, society, ecosystems, heritage and the environment.
- **Accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts.

Forest 4.0 will follow the: [Guidelines for the Assessment of Research Ethics at Kaunas University of Technology](#), approved by Order A-201 of the Rector of KTU, 23 April 2021 (revision of Order No. A-364, 12 October, 2022); The Ethics Commission at VMU activity is regulated by the [Code of Ethics](#) and the [Regulations of the Ethics Commission](#). Members of the academic community may also contact the [Office of the Ombudsperson for Academic Ethics and Procedures](#).

The Data Management Plan will be updated on month 54 of Forest 4.0 project.

This DMP was approved by project consortium members on 20<sup>th</sup> of October, 2023. Please find the link to protocol meeting here: [Forest 4.0 Meeting minutes 2023 10 20.docx](#)