SPACE-IOT SOLUTION BOX FOR CLIMATE-SMART AGRICULTURE IN AFRICA

"Empowering Climate-Smart Agriculture with Copernicus and IoT Innovations for Smallholder Farmers in Africa"

Report D1.2

Project's Data Management Plan
and Ethical Framework

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LIST OF ACRONYMS

Term	Description
AI	Artificial intelligence
CC-BY	Creative Commons license (Attribution)
DMP	Data management plan
EO	Earth observations
FAIR	Findable, accessible, interoperable, reusable
FTP	File Transfer Protocol
GEO	Group on Earth Observations
GIS	Geographic information system
GPL	General Public License
HSRS	Help Service - Remote Sensing Ltd.
HTTPS	Hypertext Transfer Protocol Secure
INSPIRE	Infrastructure for Spatial Information in Europe
IPR	Intellectual property rights
ISO	International Organization for Standardization
JSON	JavaScript Object Notation
OGC	Open Geospatial Consortium
OSM	OpenStreetMap
REA	European Research Executive Agency
SMS	Short Message Service
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
XML	Extensible Markup Language

Executive Summary

The KijaniSpace project (Project No. 101180225), funded under the Horizon Europe programme, aims to empower climate-smart agriculture for smallholder farmers in Africa through the integration of Earth Observation (EO) data from the Copernicus programme with Internet of Things (IoT) innovations. Coordinated by INNOTEC21 GmbH, the project involves thirteen partners across seven countries, with a strong focus on collaboration between Europe and Africa.

This Data Management Plan (DMP) and Ethical Framework outlines how KijaniSpace will manage and utilise data throughout the project lifecycle, adhering strictly to FAIR principles - ensuring data is Findable, Accessible, Interoperable, and Reusable. Existing datasets, such as Copernicus satellite imagery, meteorological data, OpenStreetMap, and IoT data, form the foundation for developing innovative, user-friendly solutions tailored to regional agriculture and aquaculture practices. Additionally, new data will be generated through pilot demonstrations, stakeholder engagements, and innovation experiments.

The plan emphasises transparency, compliance with GDPR, robust security measures, and rigorous ethical standards, particularly concerning human participation, personal data protection, and environmental stewardship. Clear roles, responsibilities, and resource allocation ensure effective implementation of these standards, supporting sustainable outcomes, capacity building, knowledge sharing, and equitable benefit-sharing between European and African partners.

1. INTRODUCTION

The KijaniSpace project represents a collaborative, innovation-driven initiative supported under the Horizon Europe programme (Project No. 101180225), coordinated by INNOTEC21 GmbH, and involving a consortium of thirteen beneficiaries from seven countries, including significant participation from Africa and Europe. The project's central goal is to enhance climate-smart agriculture practices in Africa by integrating Earth observation (EO) data from the Copernicus programme with Internet of Things (IoT) technologies, thereby contributing towards sustainable economic growth and green job creation.

This Data Management Plan (DMP) provides comprehensive details on how data will be managed within the KijaniSpace project. It outlines the approach to handling data throughout the project's lifecycle, ensuring transparency, accessibility, security, and adherence to ethical standards. The plan aims to maximise the impact and sustainability of project outcomes by ensuring proper management, sharing, and reuse of both existing and newly generated data.

The KijaniSpace project will leverage existing datasets such as Copernicus EO data and IoT sensor data to develop an integrated solution - referred to as the KijaniBox - which simplifies access to relevant data for local stakeholders in the Great Lake Victoria basin region. Additionally, new datasets will be generated through innovative pilot applications in crop and fish farming, stakeholder engagements, training, and SMS-based innovation experiments. These data will provide fresh insights into regional agricultural practices and the evolving needs of smallholder farmers and SMEs, further supporting local adaptation and innovation.

This DMP details the procedures and methodologies for managing data in line with the FAIR principles - Findable, Accessible, Interoperable, and Reusable. It also outlines commitments regarding data security and ethical framework, which are essential for the project's credibility and for fostering future research collaboration and policy-making efforts.

All project partners must adhere to the data management and ethical standards and practices described herein, ensuring that KijaniSpace data remains effectively managed, well-documented, accessible, and reusable throughout and beyond the project's lifespan.

2. Data Summary

The KijaniSpace project leverages diverse data sources to support the implementation of climate-smart agriculture and regional innovation across the Lake Victoria basin region in Africa. This section of the Data Management Plan provides an overview of the types and sources of data utilised and anticipated to be generated throughout the duration of the project. By detailing our data management strategies, we ensure transparency, facilitate access and promote the reuse of the data within the confines of ethical guidelines and privacy laws.

KijaniSpace will utilise and generate various types of data. A preliminary list of data to be reused (Section 2.1) and data generated (Section 2.2) are summarised below. In addition to this overview, detailed metadata of each dataset will be recorded in an internal overview of data reused and generated during the project. This metadata will also be used to monitor any ethical or intellectual property rights (IPR) issues related to the data generated or reused.

2.1. Existing data utilised by KijaniSpace

Earth observation data: Satellite imagery, primarily from the EU Copernicus programme (e.g. Sentinel scenes), supporting agricultural and aquaculture applications in the Lake Victoria Basin. These datasets are processed into indices to aid environmental analysis.

- Source: Copernicus, processed by P4A
- Data type: Remote sensing imagery and GIS raster data
- Licence: Open
- Use: Deriving agricultural indicators and supporting pilot demonstration analysis

Meteorological data: Weather, climate, and environmental datasets generated from weather/climate models and remote sensing. Sourced through partners such as Meteoblue.

- Source: Meteoblue
- Data type: Digital datasets
- Access: API-based
- Licence: TBD
- Use: Monitoring environmental conditions for agriculture and aquaculture

OpenStreetMap (OSM) data: Open geospatial data used for infrastructural mapping, spatial analysis, and contextual location-based analytics.

- Source: OpenStreetMap
- Data type: GIS data
- Licence: ODbL
- Use: Infrastructure mapping and integration in EO-based models

Local IoT datasets: Existing IoT infrastructure and sensor data from consortium partners, contributing contextual environmental parameters relevant to agriculture and aquaculture. Details to be specified later in the project.

2.2. New data or outputs to be generated

Field surveys and interviews: Surveys and structured interviews with stakeholders (farmers, fishers, SMEs) to identify practices, challenges, and innovation gaps in agriculture and aquaculture.

- Data type: Qualitative
- Handled by: LVBC
- Includes: Potential personal data; GDPR-compliant processing

Sensor and IoT data integration: IoT infrastructure will be deployed to monitor parameters like soil moisture, water quality, and weather.

- Data type: Real-time sensor data
- Method: Field data collection and integration
- Use: Model calibration and operational decision support

Pilot demonstration data: Collected during pilot demonstrations of EO-integrated IoT interventions in agriculture and aquaculture.

- Includes: Experimental results, validation datasets
- Use: Comparative evaluation of impact

Stakeholder interaction data: Data from co-creation workshops, training events, and dissemination activities.

- Includes: Participant names, affiliations, contact details (where relevant)
- Sensitive Data: Yes; managed under GDPR

3. KɪJᴀɴɪSᴘᴀᴄᴇ FAIR Dᴀᴛᴀ Aᴘᴘʀᴏᴀᴄʜ

In the digital age, the value of data lies not only in its collection but also in its effective management and utilisation.

The KijaniSpace project is committed to adhering to the FAIR data principles, ensuring that all data generated and used throughout the project are FAIR. This section details our strategic approach to embody these principles, facilitating enhanced data sharing and collaboration both within our project and with the wider research and policy-making communities.

*Findability entails making the data easily locatable by both humans and machines via well-maintained data catalogues and rich metadata that include clear, descriptive titles and keywords. **Accessibility** means ensuring that once data is found, it can be accessed by users under well-defined conditions, using standard communication protocols and with an awareness of data sensitivity. **Interoperability** involves structuring the data in formats and using vocabularies that are broadly applicable, thus enabling integration with other datasets and tools. Finally, **Reusability** is enhanced by detailed data documentation that supports replication and enables others to use and repurpose the data in different contexts.*

In this section, we will explore the methodologies, tools, and standards adopted by KijaniSpace to meet these objectives. By embedding the FAIR principles into our data management strategy, we aim to maximise the impact and utility of our data, paving the way for innovative solutions to rural development challenges.

> The primary tool to be used for sharing open research data generated by KijaniSpace is Zenodo[1]. For this reason, a Zenodo KijaniSpace community was set up (Figure 1). The community, including its members and uploaded data, can be accessed at
>
> https://zenodo.org/communities/kijanispace/

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[1] Zenodo (https://zenodo.org/) is an open-access repository developed under the European OpenAIRE program and operated by CERN. It enables researchers to share and preserve any research outputs in any size, format, and from all fields of science. Zenodo allows users to assign a Digital Object Identifier (DOI) to their data to ensure each dataset is citable and trackable.
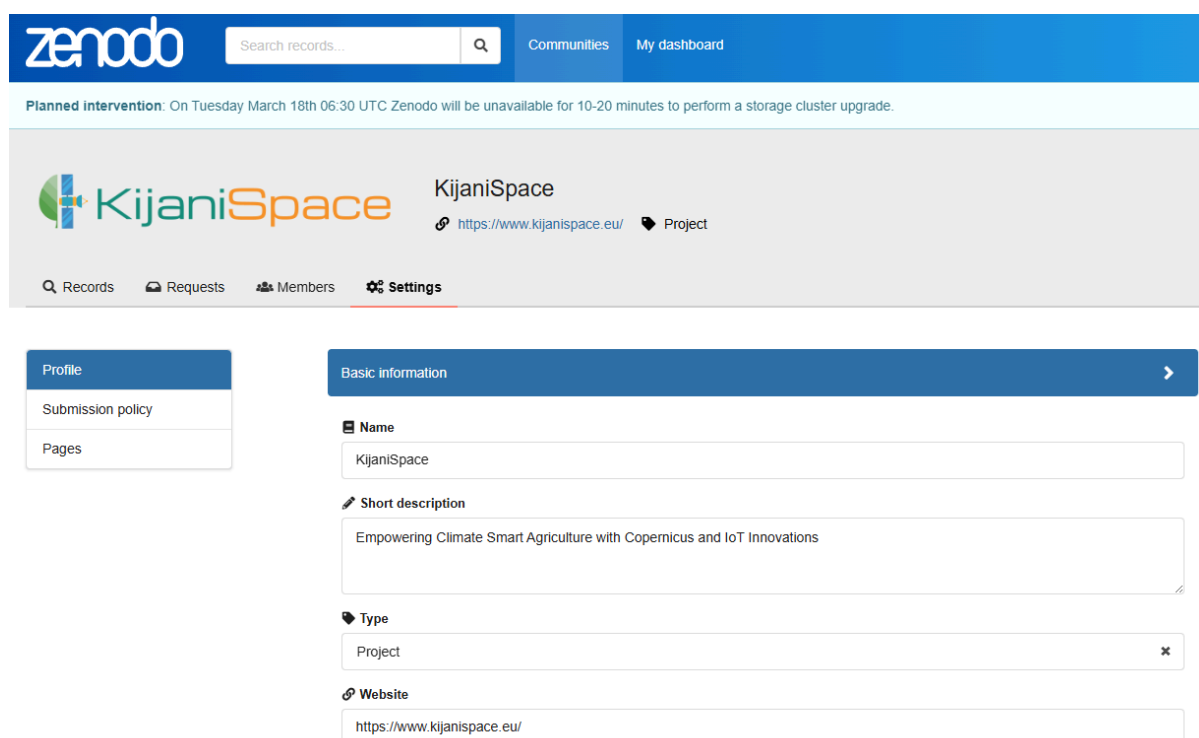
Figure 1: The KijaniSpace community at Zenodo

Project partners are encouraged to view the Zenodo tutorial - How to use and upload your research available at https://www.youtube.com/watch?v=BPVSErzNtME.

3.1. Making data findable, including provisions for metadata

Persistent identifiers: KijaniSpace will assign persistent identifiers (DOIs) to key datasets generated during the project lifecycle, particularly those intended for public reuse and citation. The DOI (Digital Object Identifier) system provided by recognised data repositories such as Zenodo or comparable platforms will ensure long-term discoverability and accessibility.

Metadata generation: KijaniSpace will systematically create and maintain metadata for all datasets. Metadata will follow established standards, notably ISO 19115 for geospatial data, ensuring consistent documentation and enhancing data discoverability. Specifically:

- **Geospatial datasets** will have structured metadata managed through platforms like GeoNetwork or Micka, complying with INSPIRE and ISO metadata standards.
- **Non-geospatial datasets** (e.g., surveys, innovation programme results, training records) will utilise Zenodo's automated metadata generation service or equivalent

solutions, covering title, author(s), publication date, abstracts, keywords, and data format.

Search keywords: Comprehensive, descriptive, and standardised keywords will be included in metadata records, aligning with project topics such as "Earth Observation," "IoT," "Climate-smart agriculture," "Great Lake Victoria," and "Innovation Program."

Harvesting and indexing: Metadata records will be harvested and indexed in widely recognised data repositories (e.g. Zenodo, OpenAIRE, GEO Portal), facilitating easy location via search engines and integration into other EU data infrastructures.

3.2. Making data openly accessible

As a general principle, KijaniSpace commits to making datasets openly accessible whenever possible. However, certain data may be subject to access restrictions due to:

- **Personal Data Protection (GDPR):** Personal information collected during stakeholder interactions, surveys, and workshops will be anonymised or pseudonymised before dissemination, with explicit informed consent obtained when necessary.
- **Intellectual Property Rights (IPR):** Proprietary datasets provided by partners, particularly those from commercial IoT infrastructures, might have usage restrictions clearly defined by consortium agreements. Access to these datasets will be managed according to the terms specified in these agreements.
- **Security and sensitivity considerations:** Any data containing sensitive information will be stored securely with access limited to authorised personnel. For example, IoT sensor data collected from farms may contain sensitive information, such as data on environmental conditions that could be commercially sensitive. These datasets will be treated with additional security measures, and access will be restricted accordingly.

3.2.1. IoT Sensor Data Collection and Access Levels

KijaniSpace will collect IoT data from sensors deployed in selected farms for two main use cases: **Crop Monitoring** and **Fish Monitoring**. The datasets will include discrete data points such as pH, temperature, humidity, and various chemicals. The data will be categorised as follows:

- **Open Data:** Most of the sensor data, including non-sensitive environmental and agricultural data (such as temperature, humidity, and general pH levels), will be openly available to the public through the KijaniSpace Hub. This data will be disseminated using standardised, open communication protocols (HTTPS, FTP, OGC services) to ensure easy integration into GIS systems and other applications.

- **Restricted Data:** Certain datasets might include sensitive information, such as proprietary or commercially sensitive data related to farm management or specific chemical usage. Access to these datasets will be restricted and will require approval from the Data Access Committee. Access requests will be reviewed on a case-by-case basis, considering the nature of the data and the intended use.

3.2.2. Access Mechanisms and User Levels

To ensure appropriate data access based on user roles and data sensitivity:

- **User Levels:** Different access levels will be defined to grant varying degrees of access to the data:
  - **Public users:** Open data (non-sensitive datasets) will be freely accessible through the KijaniSpace Hub and Zenodo for academic, research, and development purposes.
  - **Partner and engineering users:** Partners and engineers developing applications in agriculture will be granted access to both open and restricted data (subject to approval) via controlled access points, ensuring they can use the data in compliance with project agreements.
  - **Restricted access:** Sensitive data, particularly from commercial IoT infrastructure, will be shared only with authorised users, including project consortium members and approved external partners, under clearly defined access terms.
- **Requests for restricted data** will be reviewed by the data owner. The data owner will ensure that data sharing complies with both legal and contractual obligations, including IPR and GDPR.

Two key platforms will ensure effective data dissemination:

- **KijaniSpace Hub (geospatial data):**
  A dedicated platform providing open, standardised, and interoperable geospatial data. It will utilise established standards (OGC WMS/WFS/WCS) to facilitate seamless data integration into GIS and other applications.
- **Zenodo (non-geospatial data):**
  Non-geospatial data and other project outputs, such as surveys, reports, training resources, and innovation program outputs, will be published on Zenodo, securing long-term preservation and persistent access.

3.3. Making data interoperable

To achieve high levels of interoperability, the KijaniSpace project will adhere to internationally recognised data and metadata standards, formats, and vocabularies that are endorsed by the research community. For general research data JSON or XML for data formatting. For

geospatial data, we will follow the OGC (Open Geospatial Consortium) standards and the INSPIRE directive, which provide frameworks for sharing geographic information and services. These standards ensure that our data is compatible with global systems and can be easily integrated with other datasets and tools.

When uploaded to the repository, research data and outputs should only be stored in a preferred file format that conforms to the international standards (based on the KNAW‑DANS Preferred Formats[2], November 2015) to ensure future compatibility. These are some types of formats for long-term preservation of research data that we recommend being used in KijaniSpace:

- Document (.txt; .pdf; .doc; .docx; .odt)
- Spreadsheet (.csv; xls; .xlsx; .ods)
- GIS vector data (ESRI Shapefile, GeoParquet, GeoJSON, PostGIS)
- GIS raster data (.geotiff; .img, NetCDF)
- Database (.csv; .sql; .mdb; .accdb)
- Picture (.jpg; .tif; .png)
- Audio (.wav; mp3)
- Video (.avi; .mp4; .mov)

3.4. Increase data re-use (through clarifying licences)

All data produced by the KijaniSpace project will be made freely available in the public domain whenever possible, using standard reuse licenses such as Creative Commons licenses (e.g., CC-BY or CC0), in accordance with the obligations set out in the Grant Agreement. This approach promotes the widest re-use possible by minimising legal barriers, thereby encouraging innovation and further research.

Thorough documentation of the provenance of the data will be maintained, adhering to appropriate standards. This includes tracking the origin of the data, any changes made, and the methodologies applied throughout the data lifecycle. Such documentation is crucial for validating the data's integrity and authenticity.

4. OTHER RESEARCH OUTPUTS

Apart from the datasets described in the preceding sections, the KijaniSpace project will generate additional research outputs that contribute significantly to achieving the project's overall goals. The KijaniSpace project will rigorously apply the FAIR principles across all categories of outputs, including software, methodologies, models, and other results.

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[2] https://dans.knaw.nl/en/file-formats/

We will utilise robust platforms such as GitHub or GitLab for the collaborative development, version control, and hosting of our software tools. An appropriate open-source license (e.g., MIT, GPL, Apache) to clarify how others can use and modify the code will be chosen on a case-by-case basis.

The project outputs will encompass various formats, including methodologies, software tools, documentation, reports, training materials, policy briefs, and various forms of multimedia. This chapter summarises the primary categories of these outputs and outlines their anticipated management practices:

- **Software tools and platforms:** The project will develop the Space-IoT Solution Box (KijaniBox), a central innovation enabling the integration of Earth Observation and IoT data. This solution box will include software components, APIs, and interfaces designed to support climate-smart agriculture applications in pilot sites. Where feasible, software development will adhere to standard coding practices, including version control, documentation, and open-source licensing. Tools and software developed under the project will typically be released under permissive open-source licenses (such as MIT or GPL), ensuring maximum reuse and interoperability.
- **Methodologies and models:** KijaniSpace will generate several research methodologies and analytical models, notably related to:
  - Integration of EO data and IoT datasets for climate-smart agriculture applications.
  - Data analysis methods for assessing climate-smart crop and fish farming practices.

  Detailed documentation of these methodologies and models will be published in deliverable reports and, when possible, peer-reviewed publications. The documentation will clearly specify the conditions for reuse and adaptation, typically encouraging their open reuse within research and policy communities.

- **Training and educational materials:** To support capacity building and skills development, the project will create and distribute various training and educational materials, such as:
  - Training manuals and guidelines focusing on integrating Copernicus EO data with local IoT data.
  - Presentation materials (slides, tutorials, webinars) used in training sessions for stakeholders.
  - Online and multimedia resources (videos, recorded webinars) designed for broader stakeholder outreach and self-paced learning.

  These resources will be openly accessible through the project's official website, dedicated repositories, and appropriate educational platforms to ensure broad dissemination and sustained impact.

- **Project reports and policy documents:** The project will produce comprehensive reports, technical deliverables, white papers, and policy briefs to share findings and

recommendations with policymakers, researchers, industry stakeholders, and communities involved in climate-smart agriculture initiatives. All project reports and documents intended for public dissemination will adhere to the principles of clarity, transparency, and accessibility. Wherever permissible, reports will be made publicly available through project portals and repositories (such as Zenodo and the project website).

- **Multimedia and promotional materials:** Promotional materials such as videos, infographics, presentations, and digital flyers will be produced throughout the project to facilitate engagement, dissemination, and outreach activities. Such materials will be openly licensed (e.g., Creative Commons Attribution), clearly documented, and stored in accessible formats to maximise visibility and reuse.
- **Standards and guidelines:** Where applicable, KijaniSpace will contribute to or develop standards and guidelines relevant to integrating Earth Observation data with IoT in climate-smart agriculture contexts. All developed standards or guidelines will align with recognised international standards (ISO, OGC) and will be openly documented and disseminated through relevant standardisation bodies and communities.

5. ALLOCATION OF RESOURCES

Efficient and robust data management throughout the KijaniSpace project lifecycle requires dedicated personnel, technical infrastructure, and financial provisions. This chapter outlines how the project will allocate resources effectively to fulfil its data management obligations and to ensure full compliance with FAIR principles and relevant regulatory frameworks (e.g., GDPR).

Roles and responsibilities: Data management within the KijaniSpace project is a shared responsibility among all consortium partners, with clearly defined roles:

- Project coordinator (INNOTEC21 GmbH): Responsible for monitoring and coordinating data management activities, ensuring compliance with the Data Management Plan (DMP) and reporting to the granting authority.
- WP and task leaders: Tasked with data collection, generation, processing, and storage specific to their work packages. They ensure timely delivery of data, adherence to metadata standards, and GDPR compliance.
- Plan4all (P4A) and HSRS: Provide technical infrastructure and expertise, particularly in geospatial data management, metadata cataloguing, and support for FAIR principles implementation.
- All consortium partners: Responsible for generating data, ensuring its quality, documentation, secure storage, and contributing to metadata creation in line with project guidelines.

Resources for data management: Dedicated resources have been allocated within the project's lump-sum budget to cover necessary costs associated with data management, including:

- **Technical infrastructure**: Deploy and maintain platforms such as KijaniSpace Hub for geospatial data and Zenodo for non-spatial data storage and dissemination.
- **Cloud storage and backup**: Secure cloud storage solutions will be utilised by partners to ensure data safety, regular backups, and long-term preservation.
- **Personnel resources**: Consortium members have allocated sufficient human resources (data managers, GIS specialists, software developers) to implement data management tasks, including metadata creation, dataset curation, data quality control, and maintenance of repositories.

Training and capacity building: KijaniSpace will allocate resources for training project staff and stakeholders in effective data management practices, including:

- FAIR data principles and metadata creation.
- GDPR compliance and sensitive data handling.
- Use repository systems (Zenodo, Micka metadata catalogue, KijaniSpace Hub).

Training will be integrated into project meetings and workshops to build capacity across the consortium and among stakeholders.

Costs of data management: The costs associated with data management (such as repository hosting fees, DOI assignments, cloud services, training events, and dissemination activities) are included within the project's lump-sum budget. These costs have been anticipated and budgeted explicitly within relevant Work Packages.

6. DATA SECURITY

Data security is a key priority for the KijaniSpace project. Given the nature of the data involved—including personal, environmental, geospatial, and sensor-based datasets—appropriate technical and organisational measures will be applied to ensure integrity, confidentiality, and data availability throughout the project lifecycle.

Secure storage and infrastructure: All project data will be stored on secure, GDPR-compliant platforms, including cloud-based infrastructure and institutional servers, with routine system updates and vulnerability patches. For geospatial data, the KijaniSpace Hub will implement user and role-based access restrictions, logging, and monitoring capabilities. Non-spatial data will be hosted via repositories such as Zenodo, which offer certified preservation and protection mechanisms.

Access control and authentication: Access to sensitive or personal data will be strictly limited to authorised personnel. Strong authentication mechanisms, including two-factor authentication and secure credential management, will be employed. Internal permissions will follow the principle of least privilege, and all access activities will be logged and monitored where technically feasible.

Data encryption: All sensitive data will be encrypted both at rest and in transit using strong, industry-standard encryption protocols (e.g. AES-256, TLS). This includes partner data exchanges, uploads to repositories, and field-collected data transmissions.

Data minimisation and pseudonymisation: Where personal data must be collected (e.g., during interviews or surveys), KijaniSpace will follow the principle of data minimisation — collecting only the data strictly necessary for the stated research purposes. Pseudonymisation or anonymisation techniques will be applied as early as possible to reduce risk in case of unauthorised access.

GDPR compliance and legal basis for processing: Personal data processing will be done in full compliance with the General Data Protection Regulation (Regulation (EU) 2016/679). Data subjects will be fully informed of their rights, and explicit, informed consent will be obtained where required. The legal basis for processing data will be clearly documented and auditable.

Data transfer and mobility considerations: Where data is transferred between EU and non-EU countries (e.g., between European and African partners), special attention will be paid to data transfer mechanisms to ensure compliance with GDPR. Where required, Standard Contractual Clauses (SCCs) will be used for lawful data transfers.

Integration with ethical oversight: Data security measures align closely with the project's ethics framework. Metadata associated with each dataset (see Chapter 2 for more details) will be used not only for technical documentation but also for monitoring potential ethical and

intellectual property rights (IPR) concerns. This integrated approach ensures that data security supports broader compliance with ethical standards and responsible research practices.

7. ETHICS FRAMEWORK

The KijaniSpace project is fully committed to maintaining high ethical standards throughout the duration of the project, strictly complying with relevant European Union policies, fundamental ethical principles, and international guidelines. The ethical approach covers all aspects of data collection, processing, analysis, dissemination, and storage, particularly concerning handling sensitive and personal information.

Ethical standards and regulations: KijaniSpace commits to adhering strictly to

- European Union and Horizon Europe ethical guidelines
- General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679)

Each partner, including non-EU entities, will formally declare their compliance with these ethical standards and guidelines.

Human participation and voluntary engagement: Human participants are engaged through surveys, questionnaires, interviews, and workshops. The project ensures:

- Voluntary participation: All stakeholder participation is strictly voluntary. Recruitment materials clearly communicate the project's purpose, risks (if any), and participant rights.
- Informed Consent: Participants will provide explicit, informed consent before involvement. Procedures for obtaining informed consent are clearly documented in project management guidelines.

Personal data management: The project collects limited personal data (names, contact details, professional affiliations). Sensitive categories (e.g., ethnicity, biometrics, genetics, health, political opinions, religious beliefs, sexual orientation) are explicitly not collected. Personal data management will:

- Comply fully with GDPR provisions.
- Ensure secure storage, confidentiality, and anonymisation or pseudonymisation where feasible.
- Restrict access to personal data to authorised personnel only.

See more details in Chapter 6. Data Security.

Benefit sharing and international cooperation: KijaniSpace emphasises fair benefit-sharing principles, especially with African partner countries (Kenya, Uganda, Tanzania):

- Research outcomes and newly generated knowledge will be equitably shared between EU and African partners.

- African stakeholders will actively participate in knowledge creation, project implementation, and co-authorship of publications, ensuring meaningful benefit-sharing.

Environmental and animal welfare considerations: The project explicitly adheres to the "Do No Significant Harm" principle, ensuring that all activities:

- Do not negatively impact endangered fauna, flora, protected areas, or natural resources.
- Consider indirect impacts on animals (primarily fish farming), ensuring activities promote sustainable practices without causing harm.
- Do not involve endangered species or ecosystems and comply fully with the EU's environmental and sustainability principles, including the "Do no significant harm" principle.

Safety and risks for research staff: While project activities involve international travel, especially to African partner countries, potential risks to researchers will be proactively managed:

- Project staff will receive clear guidance and safety training to mitigate identified risks during fieldwork and international travel.
- Comprehensive risk assessments will precede travel activities to ensure staff safety.

Artificial intelligence (AI) considerations: The project includes using Artificial Intelligence (AI) exclusively in agricultural and environmental contexts. AI will not involve human-related interventions, respecting ethical standards and ensuring the absence of risks to individuals.

Ethical oversight: The KijaniSpace consortium will appoint an Ethics Manager, supported by a Consortium Ethical Committee, responsible for overseeing and ensuring adherence to all ethical guidelines outlined above. Regular monitoring and reporting will ensure continuous compliance.

8. CONCLUSIONS

The KijaniSpace data management plan and ethical framework sets a comprehensive foundation for responsible and sustainable data handling and ethical conduct throughout the project. This is a living document and will be updated throughout the project to reflect new developments, insights, and requirements as they arise. By systematically applying FAIR principles, maintaining stringent data security measures, and upholding high ethical standards, KijaniSpace can maximise the value, impact, and reuse of generated data and research outputs.

The project's commitment to open-access dissemination, transparent methodologies, and stakeholder engagement will foster collaborative opportunities, innovation, and long-term capacity building, particularly benefiting African smallholder farmers and local communities. Under the guidance of the appointed Ethics Manager and Consortium Ethical Committee, rigorous ethical oversight will ensure continuous adherence to EU regulations, ethical guidelines, and the "Do No Significant Harm" principle.

In summary, this strategic and ethical approach reinforces KijaniSpace's mission to create meaningful, sustainable change in climate-smart agriculture practices across Africa, paving the way for future research, collaboration, and socio-economic development in the region.

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