D1.5 Repository GM, v1

M23/July 2025

Funded by the European Union

This project has received funding from the Horizon Europe research and innovation programme under Grant Agreement No 101112838.

Acronym	SoilWise
Project Full Title	An open access knowledge and data repository to safeguard soils
GA number	101112838
Topic	HORIZON-MISS-2022-SOIL-01-01
Type of Action	HORIZON Innovation Actions
Project Duration	48 months
Project Start Date	1-Sep-23
Project Website	www.soilwise-he.eu
Deliverable Title	Repository GM, v1
Delivery Time (DOA)	M21 (new due date M23)
Deliverable Submission Date	31/07/2025
Dissemination Level	PU - Public
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Work Package	WP1
Dissemination level	Public
Keywords	Governance model, stakeholder collaboration, knowledge stewardship, data interoperability, knowledge and data governance
Abstract	The purpose of the SoilWise Repository Governance Model is to ensure that the SoilWise platform evolves as a transparent, participatory, and policy-aligned digital infrastructure for soil-related knowledge. This governance model defines how stakeholder collaboration, legal compliance, knowledge stewardship, and data interoperability are structured and operationalized across the SoilWise project. This first version lays the groundwork for long-term institutional integration with the European Soil Observatory (EUSO) and will be refined over the course of the project.

Disclaimer

In this document, the acronym 'DOMG – VL O' is used to refer to the Department of the Environment and Spatial Development, Flanders, Belgium, as per the partner's request for clarification. It's noted that in the grant agreement, the partner is identified by the acronym VL O (Vlaamse Gewest).

List of Abbreviations

AI	Artificial Intelligence
API	Application Programming Interface
CAP	Common Agricultural Policy
CEADS	Common European Agricultural Data Space
CORDIS	Community Research and Development Information Service
D	Deliverable
DestinE	Destination Earth
DGA	Data Governance Act
DG AGRI	Directorate-General for Agriculture and Rural Development
DSSC	Data Spaces Support Centre
EC	European Commission
EEA	European Environment Agency
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
EJP Soil	European Joint Programme on Soil
EOSC	European Open Science Cloud
ESDAC	European Soil Data Centre
EU	European Union
EUSO	EU Soil Observatory
ExBo	Executive Board
FAIR	Findable, Accessible, Interoperable and Reusable
FAO	Food and Agriculture Organization
GDPR	General Data Protection Regulation

GM	Governance Model
GSP	Global Soil Partnership
HE	Horizon Europe
INSPIRE	Infrastructure for Spatial Information in Europe
IoT	Internet of Things
JRC	Joint Research Centre
JSON	JavaScript Object Notation
KM	Knowledge Management
LUCAS	Land Use/Cover Area Frame Survey
M&E	Monitoring and Evaluation
ML	Machine Learning
OpenDEI	Open Digital Ecosystems for Innovation
PrepSoil	Preparatory Action for Soil Monitoring in Europe
RDF	Resource Description Framework
REA	Research Executive Agency
SDI	Spatial Data Infrastructure
SMEs	Small and Medium-sized Enterprises
SML	Soil Monitoring Law
SWR	SoilWise Repository
T	Task
UC	User Case
WP	Work Package

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Executive summary

The SoilWise project, under the Horizon Innovation Actions, aims to develop an open-access soil knowledge and data repository to support users in safeguarding soil across Europe. With 60-70% of European soils currently considered unhealthy. The project addresses the urgent need for reliable and harmonized data to support informed decision-making at various levels, aligning with the EU Mission 'A Soil Deal for Europe' and other related strategies. SoilWise, spanning 48 months and involving 15 partners, is designed to create a scalable, modular repository that leverages Artificial Intelligence (AI) and Machine Learning (ML) technologies to make soil data Findable, Accessible, Interoperable, and Reusable (FAIR).

Purpose

This deliverable presents the first version of the SoilWise Repository Governance Model (GM v1), which defines how stakeholder collaboration, legal compliance, knowledge stewardship, and data interoperability are structured and operationalized across the SoilWise project. The purpose of this governance model is to ensure that the SoilWise platform evolves as a transparent, participatory, and policy-aligned digital infrastructure for soil-related knowledge. This first version lays the groundwork for long-term institutional integration with the European Soil Observatory (EUSO) and will be refined over the course of the project in Deliverable D1.6 – SoilWise Repository GM, v2 (M42).

Intended Audience

This deliverable is intended for project partners involved in platform coordination, stakeholder engagement, data strategy, and knowledge management. It is also relevant for external stakeholders such as EUSO/JRC representatives, EU-level policy makers, and organizations involved in the design and governance of European data spaces. The document may be of specific interest to professionals responsible for interoperable soil information systems, data sovereignty, compliance with EU data laws, and the development of cross-sectoral data governance frameworks.

Description of the Main Activities

The governance model was developed by synthesizing principles from OpenDEI, FAIR data management, and concepts from ISO 30401 on knowledge governance, combined with legal obligations stemming from the GDPR, Data Governance Act, EU Data Act, AI Act, and the recently proposed EU Directive on Soil Monitoring and Resilience(Soil Monitoring Law, SML). It integrates findings from earlier project tasks, including stakeholder typologies (T1.1), collaboration with EUSO (T1.2), technical requirements and validation (T1.3), and strategic inputs from the data strategy (T2.4) and knowledge management strategy (T3.4). The deliverable is grounded in a participatory approach, iteratively shaped by stakeholder engagement and user case validation.

Throughout the first project cycle, governance development was informed by workshops, demonstration events, bilateral meetings, and stakeholder consultations. A GitHub-based governance repository was launched to provide full transparency of governance discussions, proposed changes, and decision tracking. This participatory infrastructure ensures that feedback is traceable, inclusive, and responsive to evolving technical and legal conditions.

Key Results

- **Result 1: Multi-stakeholder governance structure defined and operationalized**

  The deliverable outlines a five-entity governance model (coordination team, governance board, stakeholder assembly, advisory panels, and technical operators). These entities are supported by defined roles, escalation protocols, and consensus-based decision-making processes to ensure transparent and distributed governance.

- **Result 2: Integration of FAIR, ISO 30401, and OpenDEI principles into a practical governance framework**

  The model explicitly maps governance elements, such as metadata stewardship, knowledge co-creation, and access protocols-, to internationally recognized principles and standards. This supports both system interoperability and stakeholder trust.

- **Result 3: Establishment of governance implementation tools and evaluation mechanisms**

  GitHub is used as a participatory governance log and issue tracker, linked to the rolling plan (D1.1) and M&E checkpoints built into the project lifecycle. This enables adaptive governance through structured, traceable, and co-owned refinements across the project's duration.

Research and Practice Implications

The governance model provides a reusable blueprint for other EU-funded data infrastructures seeking to balance openness with legal and ethical compliance. It demonstrates how to operationalize governance principles in a modular, transparent way that supports cross-sector integration and continuous improvement. The GitHub-based feedback and versioning system is an innovative tool that merges technical development workflows with participatory governance needs.

Practically, the model improves stakeholder engagement, clarifies responsibilities around data sharing and reuse, and reduces ambiguity regarding licensing, consent, and metadata quality. These elements are essential for ensuring that the SoilWise repository is usable, trusted, and future-proof. The governance approach directly enhances repository adoption and supports its integration into the broader European data space ecosystem.

Policy Implications

This deliverable supports the implementation of the EU's Soil Monitoring Law by promoting harmonized governance of soil health indicators and data reporting obligations. It also contributes to the development of the Common European Agricultural Data Space, the Green Deal Data Space, and aligns with key elements of the EU Data Strategy. The results are most relevant to EU-level policymakers and JRC staff responsible for EUSO, but also provide actionable insights for national agencies involved in soil monitoring and digitalization.

Conclusion

Deliverable D1.5 provides the first full version of the SoilWise Repository Governance Model, embedding co-creation, compliance, and continuous learning into the platform's design. It enables stakeholders to participate in shaping the platform's evolution and lays the foundation for sustained integration with the European Soil Observatory. The insights, tools, and frameworks developed here will be refined in the next project phase, leading to a consolidated and validated governance model in Deliverable D1.6 (M42).

1 Introduction

1.1 Project Summary

Now more than ever, soil health is an issue that needs to be addressed urgently, as recent assessments state that 60-70% of European soils can be considered unhealthy (Bouman, 2022). The EU Mission 'A Soil Deal for Europe', the EU Soil Strategy and the proposal for a Soil Monitoring and Resilience Directive (5 July 2023) aim to have 75% of EU soils healthy or significantly improved by 2030 and all soils healthy by 2050. Reaching such an ambition requires, among others, access to reliable, harmonised existing and new data and knowledge collected at local, national and EU levels to allow **informed decision-making at all scales to support the proposed Soil Monitoring and Resilience Directive and the EU Soil Strategy**.

☞ **SoilWise aims to develop, test, and deliver a prototype for a long-term knowledge and data repository that is expected to become part of EUSO. Fifteen project partners must design, develop, validate, and demonstrate the solution. Five practice-oriented "user cases" will support the demonstration of the solution, representing six target groups and their needs.**

The SoilWise project will provide an integrated and actionable access point to scattered and heterogeneous soil data and knowledge in Europe, making them FAIR (Findable, Accessible, Interoperable and Reusable) and improving trust, willingness, and the ability to share and re-use soil data and knowledge. In three project development cycles, **co-creation and co-validation by multi-stakeholder groups are at the centre of project activities**.

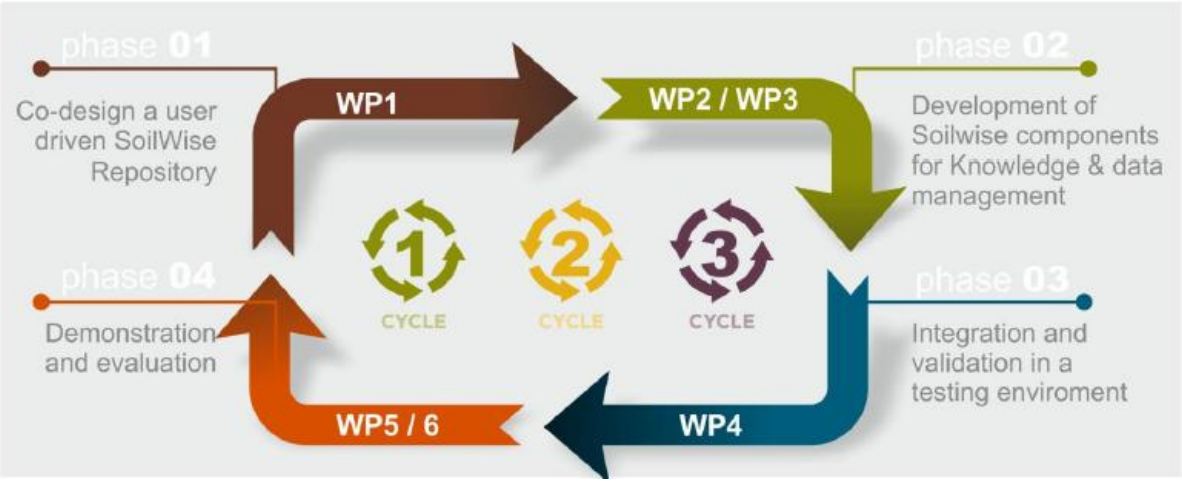

Figure 1 SoilWise process approach is based on three development cycles (C#), each comprising four phases (P#).

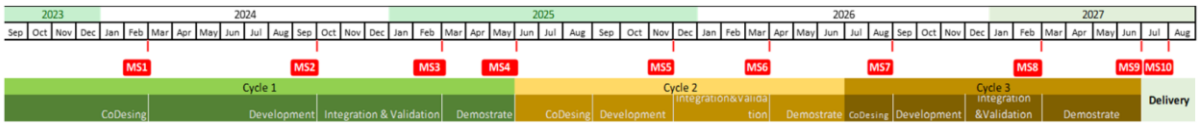

Figure 2 SoilWise project timeline. The project follows an iterative approach, split into four phases, which are intentionally repeated into three cycles.

SoilWise recognizes the workflows and repositories that users already rely on and aims to make their lives easier by enhancing these processes through the software platform being developed within the project, improving discoverability, usability, and connectivity. An open, modular, scalable, and extensible knowledge and data repository building on existing and new technologies will be provided while respecting data ownership, access policies and privacy. AI and ML techniques will be employed to interlink scattered data and knowledge, automate the processes, infer new knowledge and increase FAIRness. **SoilWise applies infrastructure thinking instead of project thinking to design a repository that will be operational for at least a decade to support EUSO evolvement accordingly**. The SoilWise repository and community are designed to be a joint starting point and common ground for countries, the European Commission, and other stakeholders to jointly guide soil and related spatial policy and informed decision-making towards the 2030 goals of the Green Deal, achieve healthy soils in 2050 and ensure broad uptake and implementation by land managers, policy, research, and industry.

All personal data acquired through SoilWise is processed in strict accordance with the relevant EU privacy regulations, underscoring our unwavering commitment to upholding the highest standards of data privacy and security for our users. This dedication is a cornerstone of our project.

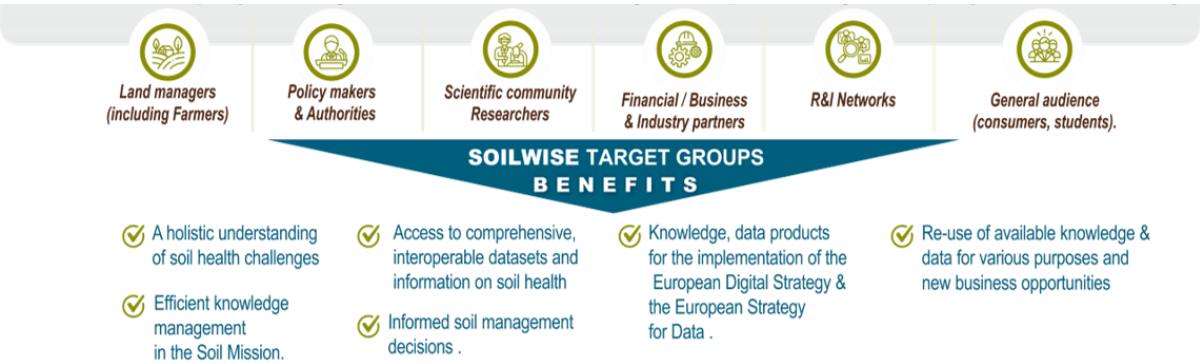

Figure 3 SoilWise actors

1.2 Document Scope and Structure

This deliverable, titled “Repository GM, v1”, describes the first version of the SoilWise Governance Model (GM) for open and accessible knowledge. It aligns to one of the work package (WP) 1 objectives **to deliver innovative governance models that supports the development of trusted and interoperable data spaces for data and knowledge exchange on soil domains**.

While the focus is on the governance of the SoilWise Repository (SWR), this cannot be addressed in isolation. The repository's trustworthiness, usability, and interoperability depend on broader data and knowledge governance structures, making both levels inherently interdependent. Therefore, aspects of soil data and knowledge governance are discussed in this deliverable as well, to the extent that they are affect the SoilWise repository governance and functioning. Although as SoilWise project we (co-)develop a view on the governance of soil data and knowledge in Europe, given its central role for the SoilWise repository, this is a topic that should be co-developed together by all relevant soil data and knowledge actors in Europe. As SoilWise project we aim to actively contribute to this discussion and development, but we consider this development to be out of scope for this deliverable.

An updated version of the SoilWise governance model will be developed during the third cycle.

The document is structured as follows:

- **Chapter 1**: Introduction to SoilWise and the purpose of this deliverable.
- **Chapter 2**: Contextual overview, including EU policy landscape, legal frameworks, and stakeholder typology.
- **Chapter 3**: Current status of soil data governance, based on mapping exercises and input from related tasks.
- **Chapter 4**: The SoilWise Governance Model, covering guiding principles (OpenDEI, FAIR, ISO 30401), structural components, roles, data sharing practices, compliance measures, and knowledge governance.
- **Chapter 5**: Monitoring and evaluation approach to ensure the governance system evolves with stakeholder needs.
- **Chapter 6**: Sustainability and handover roadmap for integration into the European Soil Observatory (EUSO).
- **Chapter 7**: References.
- **Chapter 8**: Annexes, including a link to the SoilWise Governance GitHub repository.

1.3 Relationship to other project deliverables

This deliverable relates to and complements the following deliverables:

- **D1.1** – Usage Scenarios, Requirements, v1 (M6)
- **D1.3** – Repository architecture, v1(M23)
- **D1.6** – Repository GM, v2 (M42)
- **D2.1, D2.2**– Developed & Integrated DM components, v1, v2 (M13, M18)
- **D2.5, D2.6** – Report on strategy for FAIRness on soil data, v1, v2 (M27, M42)
- **D3.1, D3.2,**– Developed & Integrated KM components, v1, v2(M13, M18)
- **D3.5, D3.6** – Report on strategy for effective soil KM, v1, v2 (M27, M42)
- **D4.1, D4.2,**– Repository infrastructure, components and APIs, v1, v2 (M13, M18)
- **D4.5, D4.6, D4.7** – Repository Data and Knowledge Resources, v1, v2, v3 (M21, M34, M46)
- **D5.3,**– Deployment and Evaluation Report, v1, v2 (M21, M34)
- **D6.2, D6.3**– DEC and Capacity Building Plan and Report, v1, v2 (M3, M18)
- **D7.2,**– Open Science and Data Management Plan, v1(M6)

1.4 Relationship to other project tasks

This deliverable relates to the following tasks:

- T1.1 – Define Repository usage scenarios
- T1.2 – Cooperation with JRC and EUSO
- T1.3 – Requirements, Validation framework and Rolling plan
- **T1.5 – Define SoilWise Multi-Stakeholder governance model**
- T2.4 – Strategy for FAIRness of soil data
- T3.4 – Strategy for efficient KM
- T4.3 – Solutions & repository validation and population

- T5.3 – User Cases impact analysis

Input is used from Tasks 1.1, 1.2, and 1.3 that describe legal, operational and functional agreements as well as technical standards widely adopted by SoilWise actors, JRC, EUSO, other stakeholder and potential users of the SoilWise project results. Tasks 2.4 and 3.4 inform the governance of data and knowledge management respectively, ensuring alignment with FAIR data principles and concepts from the ISO 30401 KM standard. From T4.3 and T5.3, validation and evaluation outcomes are used for this deliverable.

2 Contextual Overview

2.1 Policy context

Over the past years, there has been growing policy attention in the EU toward healthy soils, leading to a range of soil health initiatives and legislation efforts. This section first provides a brief overview of the key EU policies and framework focusing on soil health and facilitating the sharing of spatial data across Europe. Then, the broader EU legal developments are presented that govern data protection, access, governance, and AI.

2.1.1 EU Soil Health Initiatives

EU Soil Strategy 2030

The EU Soil Strategy for 2030 established a vision and strategic framework to protect and restore soils while ensuring their sustainable use. It outlines a total of 90 concrete actions due by 2030, aiming to achieve the following goals by 2050 (European Commission, 2025a):

1. To ensure that all EU soil ecosystems are **healthy** and more resilient, enabling them to continue delivering essential services.
2. To achieve no net land take and reduce soil pollution to levels healthy for humans and ecosystems.
3. To establish the protection of soils, sustainable management practices, and restoration of degraded soils as **common EU standards**.

To achieve these goals, several key actions are described in the EU Soil Strategy, including (European Commission, 2025a):

1. Developing a **dedicated legislative proposal on soil health by 2025**.
2. **Promoting sustainable soil management** as standard practice through a program that allows landowners to have their soils tested at no cost, and sharing best practices.
3. **Restoring managed** and **drained peatlands** to address and adapt to climate change.
4. Evaluating the need for a legally binding "**soil passport**" to foster a circular economy and enhance the reuse of clean soil.
5. Developing a **common methodology to assess desertification and land degradation**.
6. **Increasing research**, **data collection**, and **monitoring efforts** through societal engagement and mobilization of financial resources.

According to the EU Soil Strategy, a major cause for the alarming state of EU soils is the lack of a dedicated EU legislation (European Commission, 2021). The Commission therefore proposed the Soil Monitoring and Resilience Directive on July 5th, 2023, i.e. the Soil Monitoring Law (SML) (European Council, 2024).

Soil Monitoring Law

Within the strategic framework provided by the EU Soil Strategy, the new EU Soil Monitoring and Resilience Directive, also referred to as the Soil Monitoring Law, or SML, will provide a legal framework for monitoring, supporting improvement, and protection of soil health. The law will address key soil threats in the EU, such as erosion, floods and landslides, loss of soil organic matter, salinisation, contamination, compaction, sealing, as well as loss of soil biodiversity (European Commission, 2025a).

According to the law, member states will be required to **monitor and assess the health of all soils** in their territory using an EU harmonized methodology and report results to the Commission and EEA (European Environment Agency). The law will allow member states to incorporate existing data and adapt existing

monitoring systems. In addition, provision of information on sustainable soil management practices will be the norm in the EU, and members states will be requested to identify potential contaminated sites and limit soil sealing (European Commission, 2025a; European Commission, 2021).

INSPIRE Directive

Environmental data used by public authorities and available to the public are often linked to a specific location or geographical area. The INSPIRE (Infrastructure for Spatial Information in Europe) Directive, in force since March 2007, aims to create a European Spatial Data Infrastructure (SDI) to facilitate the sharing of environmental spatial information among public authorities across Europe. Aligning with the broader goals of the European Data Strategy, it supports policy-making across boundaries and enhances public access to spatial information by making spatial data easier to discover, share, and use. The Directive defines common standards for 34 spatial data themes, including soil, land use, and natural risk zones (European Union, 2019).

The INSPIRE Directive sets out general rules for establishing the SDI in Europe. It includes legally binding Implementing Rules that specify requirements on data provision, as well as non-legally binding Technical Guidance documents that explain how these legal obligations can be implemented in practice.

The Directive is based on five key principles (European Commission, 2025b):

- Data should be collected only once and kept where it can be maintained most effectively.
- It should be possible to combine seamless spatial information from different sources across Europe and share it with many users and applications.
- It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes.
- Geographic information needed for good governance at all levels should be readily and transparently available.
- It should be easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.

2.1.2 Relevant Legislation Impacting Data and AI

General Data Protection Regulation (GDPR)

The EU General Data Protection Regulation (GDPR), in force since May 2018, provides the EU's legal framework for the protection of personal data. It governs how personal data of individuals in the EU may be processed and transferred both within and outside the EU. It defines (i) individual's fundamental rights in the digital age, (ii) the obligations of those processing data, (iii) methods for ensuring compliance, and (iv) sanctions for those in breach of the rules (Council of the European Union, 2024).

Data Governance Act

The Data Governance Act (DGA), applicable since September 2023, aims to increase trust in voluntary data sharing, strengthen mechanisms to increase data availability, and address technical obstacles to data reuse. It supports the setup and development of common European data spaces in different sectors, including environment and agriculture, in line with the European Data Strategy. (European Union, 2022; European Commission, 2024a).

In addition to public data regulated by the Open Data Directive, the public sector also holds a significant amount of protected data (e.g. personal data, commercially confidential data). The DGA provides rules for the re-use of

such protected data under specific EU or national legislation. This enables knowledge to be extracted from sensitive data without comprising its protected nature.

The DGA also defines rules for data intermediation services to increase their trust and transparency. These services must follow strict rules so they can function as neutral third parties that connect individuals and companies with data users, without exploiting the data for their own benefit.

Furthermore, the DGA stimulates **data altruism**, encouraging entities to voluntarily make their data available for purposes of general interest, without financial reward. Entities complying with DGA's requirements for data altruism can register as 'data altruism organizations recognized in the Union' and use official logos to indicate their trustworthiness.

Within the framework of the European Data Strategy, the DGA plays a key role in strengthening the open strategic autonomy of the EU and contributes to creating trust and confidence. While the GDPR safeguards personal data, the DGA safeguards access requests by third country governments for non-personal data (European Commission, 2024a).

EU Data Act

The availability of products on the European market that are connected to the internet has grown quickly. The reuse of such volume of data provides a huge potential for innovation and competitiveness in the EU. The Data Act, in force since January 2024, builds a framework on harmonized rules on fair access to and use of data, while ensuring protection of personal data (cf. GDPR). Whereas the DGA focuses on establishing processes and structures for data sharing, the EU Data Act defines *who* can use *what* data under *which* conditions (European Commission, 2022; 2024; 2025c).

Through the application of different measures, the Data Act makes more data available for the benefit of companies, citizens and public administrations. The Data Act provides rules and measures on (European Commission, 2025c):

- **Business-to-business and business-to-consumer data sharing in the context of "Internet of Things (IoT)":** users of IoT objects can access, use and port data that they co-generate through their use of a connected product.
- **Business-to-business data sharing:** data-sharing conditions are clarified wherever a business is obliged by law, including through the Data Act, to share data with another business.
- **Unfair contractual terms**: provisions that protect all businesses, in particular SMEs, against unfair contractual terms imposed on them.
- **Business-to-government data sharing**: public sector bodies will be able to make more evidence-based decisions in certain situations of exceptional need through measures to access certain data held by the private sector.
- **Switching between data processing services**: providers of cloud and edge computing services must meet minimum requirements to facilitate interoperability and enable switching.
- **Unlawful third country government access to data**: non-personal data stored in the EU is protected against unlawful foreign government access requests.
- **Interoperability**: participants in data spaces must fulfil criteria to allow data to flow within and between data spaces. An EU repository will lay down relevant standards and specifications for cloud interoperability.

- **Enforcement:** Member States must designate one or more competent authority(ies) to monitor and enforce the Data Act. Where more than one authority is designated, a 'data coordinator' must be appointed to act as the single point of contact at the national level.

Artificial Intelligence (AI) Act

The AI Act, in force since August 2024, aims to ensure the development and use of trustworthy AI across the EU by introducing harmonized, risk-based rules for AI systems. It will become fully applicable in August 2026, with obligations for general-purpose AI models taking effect earlier, in August 2025 (European Union, 2024; European Commission, 2025d).

AI systems considered a threat to the safety, livelihoods and right of people are classified as unacceptable risks and are generally banned. When AI systems pose serious risks to health, safety or fundamental rights, they are classified as **high risks** and are subject to strict obligations before they can be put on the market. Risks associated to the need for transparency around the use of AI are classified as **limited risks**. For those risks, the AI Act sets out disclosure obligations to ensure people are informed when necessary to preserve trust. The majority of AI systems in the EU are classified as **minimal risks**, for which the AI Act does not introduce rules.

The AI Act also provides transparency and copyright-related rules for providers of large AI models to ensure its safe and trustworthy use.

2.2 Stakeholder analysis

The involvement and engagement of multi-stakeholder groups in SoilWise is not only crucial for co-creation and co-validation processes, but it also plays a central role in policy discussions and the development of a solid governance model. In SoilWise, 6 stakeholder groups have been identified (see Table 1), together with specific stakeholder types.

Table 1 Multi-stakeholder groups identified in the SoilWise project

Stakeholder group	Description
Land manager	Including farmers, farming associations, institutional & private land owners, regional & local governments. **Role:** Contributing & (re)using data and knowledge to combine with local/private sources to improve land management concerning soil health.
Policy makers, authorities	At European, national and local levels (EC, primarily JRC, DG Agri, DG ENV, European Parliament, agricultural authorities related to CAP, Ministries, Soil Health experts, etc) aimed at improving soil health. **Role:** Reusing knowledge on soil health to define effective policy and regulations. Providing data through the SML and reports from the Mission Soil.
Scientific community, researchers	Including Universities, Research & Technology organisations, corporate Researchers, works on soil Mission objectives, Data Scientists, data publishers and disseminators of soil knowledge. **Role:** (Re)users and producers of soil data & knowledge.
Financial, business, industry	Also performing research, exploiting available data and knowledge to develop new products and services.

	Role: Acting as technology developers or digital technology operators, and investors and other financial support services.
R&I networks, projects & initiatives	Such as the EIP AGRI, Horizon 2020 and HE projects & thematic networks such as GSP (Global Soil Partnership) or INSPIRE. **Role:** Data & knowledge providers and (re)users.
General audience	Including schools, consumers, other social actors who do not belong to the categories above and their primary interest, does not have to be linked with SoilWise. **Role:** Recipients for creating general awareness and interest in soil health.

As stakeholders are closely involved in co-creation and co-validation, SoilWise actively engages and collaborates with these stakeholder groups through 5 user cases (UCs). These UCs can subsequently be scaled to the wider stakeholder community and geography.

- **UC1:** Soil health performance indicators for land managers
- **UC2:** Leveraging a network of Soil R&I knowledge and data
- **UC3:** Policy making & evaluation to safeguard soil
- **UC4:** Enhanced capacities of public authorities and LLs actors
- **UC5:** Repository for new products, technologies and services

Each UC engages with relevant stakeholder target groups while identifying potential users (see Figure 4). Based on stakeholders' interest and influence, a distinction can be made between data providers and data users. While **data providers** are essential to building a coherent and robust SoilWise Repository that supports policy, science, and practice, **data users** help define the user needs and requirements for successful acceptance and use of the repository. This distinction has important implications for developing a governance model. Some stakeholders may simultaneously act as data provider and data user (e.g. scientific community, researchers).

LHs: Ligh Houses; LLs: Living Labs; UC: User Case

Figure 4 Visualisation of SoilWise Stakeholder Mapping and Use Cases

3 Current Status of Soil Data Governance

3.1 Analysis and Mapping of Current Governance Models

European Governance Landscape - JRC and EUSO

At the European level, soil data governance is influenced significantly by frameworks developed by the Joint Research Centre (JRC) and the European Union Soil Observatory (EUSO). The JRC offers detailed technical and operational guidance with a strong emphasis on standardization and interoperability, facilitating the utilization of soil data in scientific research and policy-making processes. Simultaneously, EUSO functions as a comprehensive knowledge hub, encouraging harmonization across soil data collection methods by means of the LUCAS monitoring and the methods listed in the SML to encourage comparability and data quality throughout Europe. EUSO structures its governance through thematic working groups dedicated to specific soil-related issues such as erosion, pollution, biodiversity, and nutrient management. These groups aim to bring together technical experts from academia, public institutions, and industry, fostering dialogue and generating policy recommendations. EUSO manages stakeholder involvement through forums and consultations to ensure transparency and inclusivity (Panagos et al., 2022; Schillaci et al., 2022, Panagos et al., 2024a).

The operational framework of EUSO includes managing data flows through initiatives such as LUCAS, consolidating data products within the European Soil Data Centre (ESDAC). ESDAC acts as a central hub for EU soil knowledge, providing access to harmonised datasets, maps, and scientific outputs that support policy development (Panagos et al., 2022). However, systematic integration of national soil data into ESDAC remains limited, as there is currently no mandatory mechanism for Member States to contribute harmonised soil data beyond INSPIRE obligations. This fragmentation in data flows is one of the key challenges SoilWise seeks to address by promoting interoperable, multi-level governance models and pathways for cross-border soil data sharing.

Relevant Governance Frameworks

In addition to the frameworks mentioned above, the **Common European Data Space** provides the overarching vision for a federated, sovereign, and interoperable European data infrastructure. It aims to create sector-specific data spaces, including for agriculture, environment, and soil, that adhere to shared governance, legal, and technical standards. The SoilWise governance model aligns with this broader ambition by embedding transparency, data sovereignty, and interoperability-by-design.

Within this context, the **AgriDataSpace** initiative presents valuable insights into multi-stakeholder governance models for data spaces in agriculture, which are highly relevant to SoilWise. These efforts have laid the groundwork for the **Common European Agricultural Data Space (CEADS)**, which operationalizes the AgriDataSpace vision. CEADS, coordinated by ILVO, is currently being developed to provide a trusted, sovereign infrastructure for agricultural data exchange across Europe, with a strong emphasis on user control, interoperability, and innovation.

Complementing these efforts, the **Green Deal Data Space** supports cross-sectoral environmental data sharing, including for soil, biodiversity, and climate, and ensures alignment between sectoral platforms. It promotes the reuse of high-value datasets under common governance rules and plays a key role in enabling the digital twin of the Earth envisioned in the EU's Destination Earth (DestinE) initiative.

The Data Spaces Support Centre (DSSC) further enriches this governance landscape through its foundational work on data space building blocks. Its guidance on *Organisational Form and Governance Authority* outlines the roles, responsibilities, and institutional arrangements necessary to manage data spaces effectively. It emphasises modular governance structures, such as separating orchestration from operations, and provides templates for establishing legal entities, managing membership, and ensuring fair representation of stakeholders. SoilWise draws from this framework to design a participatory governance model that ensures balanced decision-making power, accountability, and alignment with European data space best practices.

Lastly, the recently introduced **SML** further underscores the urgency of coherent soil data governance. It mandates harmonised soil health indicators, national-level reporting, and integration into EU-level infrastructures such as the **European Soil Observatory (EUSO)**. The need for harmonization and stronger integration of national monitoring schemes remains a priority for supporting EU soil health assessments and the SML (Panagos et al., 2024b).

Together, these frameworks guide the SoilWise governance model in its aim to be interoperable, legally compliant, and future-proof.

Operational, Functional Agreements, and Technical Standards

Current operational practices involve diverse protocols for data sharing, access, and licensing, varying widely in their openness and restrictions. Stakeholders utilize various types of endpoints, ranging from APIs and web services to direct database access. Storage mechanisms for soil data also vary, including centralized national databases, decentralized regional systems, and cloud-based storage solutions. A critical review of these agreements highlights inconsistencies and gaps, particularly regarding data harmonization and interoperability. Technical standards such as JSON (JavaScript Object Notation), RDF (Resource Description Framework), and the INSPIRE directive are widely adopted in soil data management, promoting interoperability and structured data exchange. These standards are essential for ensuring compatibility across datasets and facilitating seamless integration from diverse sources. However, ongoing evaluations indicate the need for continuous updates and improvements to keep pace with technological advancements and emerging data needs.

Governance Mechanisms

At present, there are limited comprehensive mechanisms in place for structured stakeholder engagement in soil data governance at the European level. While frameworks such as INSPIRE and EIONET provide important governance structures for environmental data that also includes some soil data, and global initiatives like FAO-GSP or UNCCD offer voluntary platforms for collaboration, these do not fully address the need for inclusive, multi-actor engagement focused explicitly on soil data governance, also in the context of soil health. This absence presents a significant challenge, as active stakeholder involvement is crucial for aligning governance frameworks with user needs and ensuring broad acceptance. EUSO operates through stakeholder forums, working groups, and dashboards like the Soil Health Dashboard, which monitors indicators of soil health. However, formalized advisory or decision-making bodies remain limited, suggesting room for further institutional development to strengthen governance structures (Schillaci et al., 2024). Potential mechanisms for enhanced engagement include regular consultation cycles, the establishment of advisory panels, and collaborative governance platforms to systematically gather and integrate stakeholder feedback.

Challenges and Gaps

One of the most pressing challenges in soil data governance is managing data privacy in compliance with the General Data Protection Regulation (GDPR). Soil data, such as soil organic matter content or pollution levels, can

inadvertently reveal sensitive personal or economic information about landowners or farmers. Addressing these privacy concerns requires robust data anonymization practices and secure data-sharing environments to balance openness with confidentiality effectively. Other key challenges include harmonizing data from varied sources, and addressing gaps in formal governance mechanisms. There is an ongoing need for integration across national systems and the development of new, harmonized indicators for soil health (Panagos et al., 2024) as is effectuated in the SML.

Stakeholder Insights

To enhance the effectiveness and applicability of the governance models, engagement with key European and European Commission bodies, particularly the JRC, EEA and EUSO, is recommended. These institutions possess critical insights and data management expertise, making their input invaluable for refining governance structures. While this deliverable primarily focuses on the governance model of the SoilWise Repository, it recognises that this cannot be developed in isolation from the wider soil data governance landscape. The repository's structure, trustworthiness, and interoperability rely on broader standards, policies, and stakeholder dynamics shaping soil data flows across Europe. Therefore, SoilWise applies a broad set of engagement tools to collect feedback, identify governance needs, and validate priorities with its stakeholder community, bridging both repository-specific and system-wide governance perspectives.

- **Workshops and demonstration events**, particularly those linked to use cases and project milestones.
- **Participation in cluster meetings and thematic working groups**, such as the EUSO Stakeholder Forum and the Mission Soil Data and Knowledge Management Cluster.
- **One-to-one meetings** with key stakeholders and domain experts to explore specific governance issues, including **Advisory Board meetings**.
- **Attendance at external conferences and multi-stakeholder events**, ensuring outreach beyond the project consortium.
- **Use of the SoilWise GitHub repository** to document, track, and discuss all governance-related issues transparently and collaboratively.

These mechanisms, supported by continuous feedback loops, form the backbone of the project's participatory governance approach, ensuring that SoilWise remains grounded in real-world needs and evolving expectations.

3.2 Inputs from Related Tasks

This section integrates insights from earlier tasks (T1.1, T1.2, T1.3), strategy development tasks (T2.4, T3.4), and validation efforts (T4.3, T5.3) to consolidate our understanding of the current legal, functional, operational, and technical frameworks relevant for SoilWise governance.

Legal and Policy Context

The SoilWise governance model builds upon the legal underpinnings established by European initiatives such as the SML, INSPIRE Directive, GDPR, the EU Data Act, the Data Governance Act, and the AI Act. These frameworks provide comprehensive guidance on how soil and environmental data, as well as AI-enabled services (such as the SWR's chatbot powered by large language models), can be collected, shared, accessed, protected, and ethically deployed. Specifically, the SML mandates harmonised indicators and consistent reporting, supporting

the integrity of soil health assessments. The INSPIRE Directive ensures spatial data interoperability. GDPR safeguards privacy where soil data could reveal sensitive personal or economic information. The Data Act and Data Governance Act promote fair access, portability, and secure sharing of soil and environmental data, supporting SoilWise's commitment to open data principles within clear legal boundaries. The AI Act introduces governance expectations for AI components like the SWR chatbot, focusing on transparency, accountability, and risk mitigation. These frameworks collectively shape how soil data can be collected, shared, accessed, and protected. The SML provides the legal backbone for EU-wide soil health assessments, mandating harmonized indicators and regular reporting by Member States.

Functional, Operational and Technical Framework

Functionally, SoilWise aligns with the co-design principles of OpenDEI and integrates concepts of the ISO 30401 standard on knowledge management. User case demonstrations, as reported in D5.3, tested the SoilWise Repository (SWR) through real-world applications, highlighting the need for tailored functionalities (e.g., cataloguing, semantic search, data transformation tools) and user-friendly interfaces. Operationally, SoilWise employs feedback loops, progress monitoring, and validation mechanisms documented in D4.5 and D5.3 to ensure continuous refinement of repository services and governance practices. This includes regular stakeholder consultations, iterative co-design workshops, and agile development sprints. The technical architecture described in D1.3 and validated in D4.5 establishes SoilWise as a modular, scalable platform that integrates existing soil data infrastructures (e.g., ESDAC, national databases). Standards such as INSPIRE, JSON, RDF, and APIs are employed to ensure interoperability. Demonstrations revealed gaps related to data harmonization (e.g. different methods for the determination of the same soil property), versioning, vocabulary availability and metadata quality, necessitating further alignment with and encouragement of emerging European soil data standards and FAIR principles.

The SoilWise repository harvesting strategy consolidates data and knowledge from key national, European and international repositories, including: INSPIRE geoportal, CORDIS, ESDAC, BonaRes, EJP Soil, PREPSoil, Impact4Soil, FAO Soils portal, EEA Datahub, and ISRIC - World Soil Information. This integration effort supports a unified access point and enhances discoverability of soil data across Europe.

The contributions of T1.1, T1.2, and T1.3 plays a crucial role in shaping the governance frameworks: T1.1 defines usage scenarios that guided functional priorities; T1.2 structures the cooperation framework with JRC and EUSO ensuring operational alignment; T1.3 provides the requirements, validation frameworks, and rolling plans that underpin technical design choices and operational processes.

In addition, T2.4 contributes strategic guidance on FAIR data principles, informing governance decisions around data discoverability, licensing, and interoperability (see section 4.2.3), while T3.4 will shape the knowledge management governance aligned with ISO 30401 concepts, enabling co-creation, stewardship, and reuse across stakeholder groups (see section 4.2.5).

These tasks ensure that functional, operational, and technical elements of the governance model are technically sound and aligned to real user needs and cross-institutional cooperation. T4.3 and T5.3 validation activities confirm the potential of the SWR to enhance soil data discoverability and usability. However, they also exposed operational challenges including interface complexity, onboarding hurdles, and mismatches between local data formats and repository capabilities. Additional challenges include varying levels of metadata completeness, as well as the need for harmonised, machine-readable terminology supported by controlled vocabularies. These findings directly inform the development of a multi-stakeholder governance model that is adaptive, inclusive, and capable of addressing evolving user needs.

4 Development of SoilWise Governance Model

4.1 Principles and Frameworks

The SoilWise governance model is grounded in well-established principles and frameworks that provide both strategic alignment with European policy and practical guidance for managing soil data and knowledge responsibly, ethically, and effectively. Its design reflects the need to balance openness and accessibility with legal compliance, data sovereignty, and stakeholder trust.

One of the central pillars of the model is the adoption of the **OpenDEI design principles for European data spaces**. The OpenDEI project funded by the European Commission under Horizon 2020, was launched to support the design and deployment of common building blocks for European data spaces across key sectors including agriculture, health, manufacturing, and energy. Through collaboration between digital innovation hubs, industry representatives, and data ecosystem experts, OpenDEI formulated a set of design principles aimed at fostering trusted, open, and interoperable data ecosystems in line with the European Data Strategy and the goals of the Green Deal and Digital Europe programme. These principles promote openness through the use of open standards and inclusive governance, interoperability through alignment with recognised technical and semantic standards, sovereignty by ensuring data providers retain control over how their data is accessed and used, trust through embedding privacy, security, and ethics by design, and value creation by unlocking data for innovation and societal benefit. By following these principles, SoilWise creates a repository that is interoperable with other European data infrastructures, provides clarity and assurance to data providers and users regarding rights and safeguards, embeds compliance with legal frameworks such as the GDPR, Data Act, and Data Governance Act, and supports broader policy goals such as soil health and climate adaptation. The OpenDEI principles thus provide both strategic alignment and practical guidance for the governance, technical, and operational design of SoilWise.

The model further integrates the FAIR data principles (Findable, Accessible, Interoperable, and Reusable). These principles, established in 2016 through an international initiative by data stewardship experts, have become a cornerstone of responsible research data management and are endorsed by the European Commission and the European Open Science Cloud (EOSC). FAIR principles ensure that data is discoverable through standard metadata, accessible via open protocols, interoperable with other systems and datasets, and reusable under clear conditions. In the context of SoilWise, embedding FAIR principles promotes harmonisation of soil data across national and European levels and supports the objectives of the EU Soil Strategy and the forthcoming SML.

In terms of knowledge management, the SoilWise governance model aligns concepts from ISO 30401 Knowledge Management Systems, the international standard published by ISO in 2018 to guide organisations in managing knowledge systematically and effectively. ISO 30401 emphasises alignment with organisational culture and objectives, co-creation and learning and monitoring and evaluation for continuous improvement. Its integration into the organisational ecosystem that the SoilWise repository is part of ensures that the repository not only manages soil data but also fosters co-creation and exchange of knowledge among stakeholders, supporting collaboration and the long-term sustainability of the system.

The model also draws on lessons learned from the development of the Common European Agricultural Data Space (CEADS) and the work of the AgriDataSpace project, which provided preparatory recommendations for CEADS. Announced under the European Strategy for Data, CEADS is envisioned as a trusted, sovereign, and interoperable data space that facilitates agricultural data sharing, processing, and analysis in a secure,

transparent, and responsible manner. Its deployment aims to enhance sector performance, drive data-driven innovation in both public and private sectors, reduce administrative burdens, and provide the foundation for applying powerful new artificial intelligence tools in agriculture. The AgriDataSpace project, funded under the Digital Europe Programme, contributed to CEADS by delivering recommendations on governance models, business models, and technical reference architectures while engaging stakeholders across the agri-food value chain. These efforts demonstrate how data spaces can design multi-stakeholder governance structures, define clear rules for data sharing and licensing, and build consensus among diverse actors. SoilWise draws on these lessons to ensure its governance model balances openness and data sovereignty while enabling collaboration and innovation in the sensitive domain of soil data.

Finally, the SoilWise governance model is designed to ensure alignment with key European legal and policy frameworks, including the **SML**, the **INSPIRE Directive**, the **General Data Protection Regulation (GDPR)**, the **Data Act**, the **Data Governance Act**, and the **AI Act** (see Policy context2.1). These frameworks define the legal obligations and ethical boundaries for data privacy, security, interoperability, and responsible use, particularly where soil data may intersect with personal or commercially sensitive information.

Together, these principles and frameworks provide a coherent and adaptable foundation for the SoilWise governance model. They enable the project to deliver a governance approach that is robust, inclusive, legally compliant, and capable of evolving in response to technological advances, policy developments, and emerging stakeholder needs.

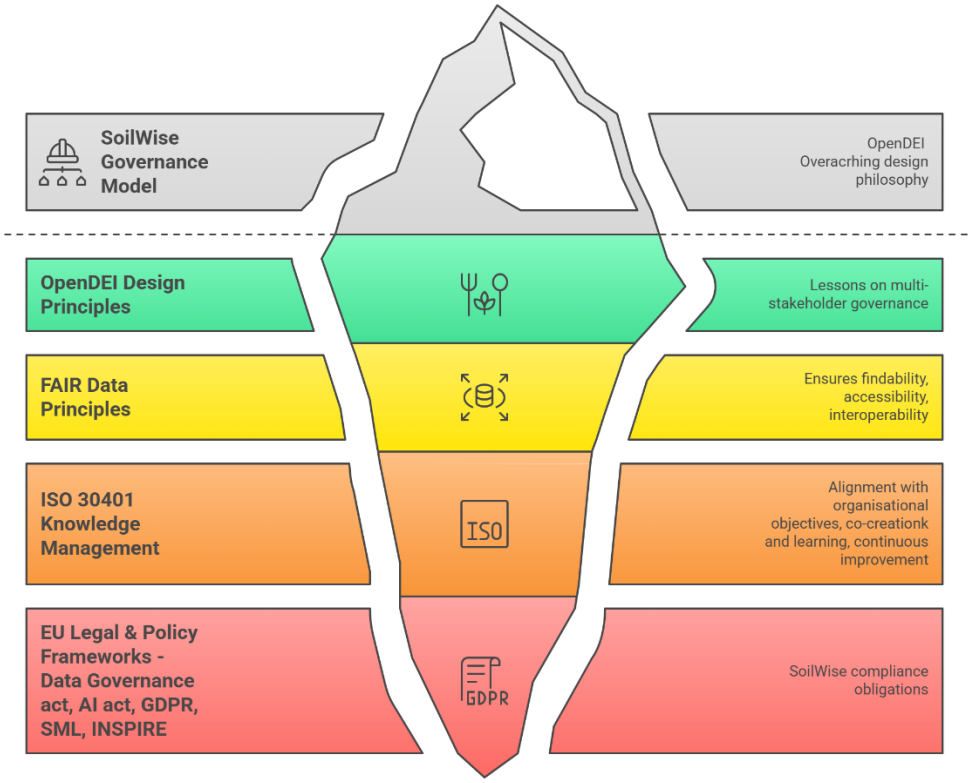

Figure 5 SoilWise Governance model Framework

4.2 Governance Model Design

The SoilWise governance model provides a structured framework for managing soil data and knowledge in a way that ensures inclusiveness, transparency, interoperability, and compliance with European policy and legal requirements. It defines how collaboration takes place among stakeholders, how decisions are made, and how roles and responsibilities are distributed, while ensuring that data sovereignty, data quality, and privacy are safeguarded.

The governance model has been designed to support the SoilWise ambition of contributing to the **European Soil Observatory (EUSO)**. While it can function independently, the governance structure is ultimately intended to align with EUSO's coordination by the Joint Research Centre (JRC), ensuring compatibility with the legal, ethical, and technical requirements of the European Commission.

The design draws on the **OpenDEI design principles** for data spaces, which promote openness, interoperability, sovereignty, trust, and value creation. It applies the **FAIR data principles** to ensure that soil data is findable, accessible, interoperable, and reusable. For knowledge management, it adopts concepts of **ISO 30401**, to align with organisational culture and objectives and foster co-creation, learning and continuous improvement. The governance model also embeds compliance with key European legal frameworks, including the **SML**, **GDPR**, **Data Act**, **Data Governance Act**, and **AI Act**.

4.2.1 Multi-Stakeholder Collaboration Framework

The SoilWise governance model is founded on the principle that soil health challenges, data harmonization, and knowledge management require cooperation across a broad community of stakeholders. No single organization or actor can address the complex scientific, technical, legal, and societal dimensions of soil data governance alone. The model therefore establishes a multi-stakeholder collaboration framework designed to bring together diverse voices, build trust, and ensure that governance decisions are inclusive, balanced, and legitimate.

Purpose and Principles

The collaboration framework ensures that:

- All relevant actors have a structured role in the governance of soil data and knowledge and the repository itself.
- Decision-making on the data and knowledge flows and the design and framework of the repository reflects the interests and needs of diverse communities, including public authorities, science, industry, and civil society.
- Governance processes are transparent, accountable, and responsive to stakeholder input.
- The model builds the necessary trust for data sharing, reuse, and integration into the European Soil Observatory (EUSO).

It reflects the OpenDEI principle of openness and inclusiveness, ensuring that no group dominates and that smaller or less-resourced stakeholders are heard. The model therefore provides a framework that ensures inclusiveness, transparency, and shared ownership, while giving appropriate weight to institutions with formal responsibilities for long-term stewardship, such as the JRC as the custodian of EUSO.

Key Stakeholder Groups

The SoilWise collaboration framework identifies and engages the following groups, ensuring that governance processes are inclusive, representative, and aligned with European soil health objectives:

Data Providers

Data providers include primarily the EU Mission "A Soil Deal for Europe" funded projects under Horizon Europe, as well as the Living Labs and Lighthouses developed as part of the Mission's implementation. SoilWise also harvests data from persistent, trusted repositories, ensuring that contributions are high-quality, reliable, and legally compliant. Additional data providers may include national soil institutes, environmental agencies, research organisations, and other entities that generate, curate, or hold soil data. These providers are essential to building a coherent and robust SoilWise Repository that supports policy, science, and practice.

Data Users

Data users encompass researchers, policymakers, land managers, industry actors, and any other stakeholders who access and apply soil data and knowledge products for decision-making, innovation, and policy development. SoilWise serves as a possible single entry point for these users to discover and access data and knowledge related to soil health across Europe, helping to bridge fragmented sources and facilitate evidence-based action.

Technical Operators and Intermediaries

Technical operators and intermediaries manage the SoilWise platform infrastructure, ensuring data security, interoperability, and alignment with technical standards required for integration with the European Soil Observatory (EUSO). At present, this role is fulfilled by members of the SoilWise consortium. However, upon the integration of SoilWise into EUSO at the end of the project, these responsibilities will transition fully to the EUSO technical team under the coordination of the Joint Research Centre (JRC).

Public Authorities

Public authorities at national, regional, and European levels play a several roles: they collect and regulate the soil data (e.g. by monitoring soils and reporting the results) and knowledge ecosystem and (we expect them to) use SoilWise outputs as inputs for designing and implementing policies. For example, SoilWise aims to support the implementation of the SML which aims to establish harmonised EU-level soil health reporting. Public authorities participation in the SoilWise repository design and evaluation help ensure that SoilWise outputs are policy-relevant and that data governance aligns with regulatory requirements and strategic objectives.

Advisory Panels

The SoilWise governance model includes an advisory function that ensures structured input into governance decisions, validates priorities, and guarantees inclusiveness. At this stage of the project, this function is carried out by key European Commission bodies with stakes in the SoilWise catalogue and repository:

- **Research Executive Agency (REA):** Oversees the delivery of a robust, long-term soil data and knowledge repository to support Mission Soil outcomes and ensure compliance with EU objectives.

- **Joint Research Centre (JRC):** Leads the development and operation of the EUSO and serves as the primary user and integrator of SoilWise outputs.

This chapter describes the governance model as designed for the SoilWise project during its implementation phase. The focus is on the multi-stakeholder framework that guides collaboration, with the JRC, REA, and DG AGRI acting as key advisors and the Mission Soil Data and Knowledge Management Cluster that ensure alignment with the Mission Soil Projects, the EU policies and the Mission Soil objectives.

In version 2 of the governance model (planned for project month 42), as technical integration advances, a new multi-stakeholder governance scheme will be proposed reflecting the outlook of the JRC operating the SoilWise platform as part of the European Soil Observatory (EUSO). This future governance will continue to follow EU principles of openness, inclusiveness, transparency, and compliance, while ensuring strong coordination under the JRC's leadership.

- **DG AGRI:** Shapes and implements the Mission Soil programme, ensuring that soil health knowledge contributes to sustainable agriculture and impactful outcomes for the agri-food sector in Europe.
- **DG ENV (prospective):** While not actively involved in SoilWise at this stage, DG ENV plays a central role in shaping the SML and co-steering the Mission Soil programme. A meeting is scheduled for August 2025 (M24) to explore potential collaboration and alignment.

This advisory function is currently facilitated through the Mission Soil cluster on Knowledge and Data Management, which provides a dialogue platform connecting these EC bodies, SoilWise, and Mission Soil projects. This structure ensures alignment on rights, obligations, and expectations among all actors, which is essential for delivering the expected impact.

In the future, the advisory panel should be adapted to reflect the evolving institutional landscape and governance setup as SoilWise interfaces more closely with EU-level infrastructures. Rather than assuming a direct transition, its composition and role should be revisited to align with emerging mechanisms such as the Mission Soil Board, the involvement of Member States, relevant EU institutions, and initiatives such as the European Open Science Cloud. This approach would help ensure that key actors responsible for harmonising soil data and knowledge across policy, research, and infrastructure domains are appropriately represented and engaged.

Figure 6 SoilWise Governance evolution from project phase to integration with EUSO.

4.2.2 Governance Structure and Decision-Making Processes

The SoilWise governance structure is designed to ensure strategic oversight, inclusive participation, and operational efficiency, while remaining fully aligned with EU soil data policies and the long-term integration with the European Soil Observatory (EUSO). It establishes a multi-layered governance framework that reflects the diverse functions and expertise within the project and anticipates its evolution beyond the project lifetime. Decision-making follows these core principles:

The SoilWise governance model is built around five key components that together ensure inclusive, transparent, and effective decision-making. These components (*Governance Board, Advisory Panels, Technical Operators & Working Groups, Stakeholder Assembly, and Project Coordination*) reflect the diversity of actors and responsibilities involved in repository development, stakeholder engagement, and future integration with EUSO. Each entity plays a distinct role in shaping, validating, and implementing governance decisions. Table 2 provides an overview of these governance bodies, summarizing their roles, key responsibilities, decision-making scope, and involved actors.

Table 2 SoilWise Governance structure

Governance Entity	Role	Key Responsibilities	Decision Scope	Actors
Governance Board	Strategic oversight and coordination during project implementation.	Approves governance updates Resolves conflicts Ensures alignment with EU policy and FAIR principles	High-level governance and escalation resolution	**EV ILVO** (T1.5 lead, project coordinator - Chair) **ISRIC** (WP1 lead, T1.2 lead) **MU** (WP2 lead, T1.4 lead, scientific coordination) **WP2-WP6 leads** **UC leads**
Advisory Panels	Policy alignment and strategic guidance from EC institutions and stakeholders.	Align with EU Soil Strategy and SML Validate priorities and outputs Provide continuity toward EUSO integration	Advisory (non-binding)	**JRC** (EUSO)- **DG AGRI** (Mission Soil) **REA**(funding compliance) Optional: **EEA**, **DG ENV, EIP Agri**
Technical Operators & Working Groups	Operational implementation of governance processes and standards.	Apply semantic and technical standards Implement interoperability frameworks Maintain data and knowledge quality control	Operational decision-making within delegated scope	**Technical leads from WP2, WP3, WP4**
Stakeholder Assembly	Consultative forum representing data users, providers, and domain actors.	Provide feedback on usability and governance inclusiveness.	Input to inform decisions (non-binding)	**WP5 and WP6 Leads** **UC leads** **Mission Soil Platform** (Clusters)

		Raise issues via workshops, feedback sessions, or GitHub- Identify new needs.		
Project Coordinator (EV ILVO)	Ensure integration across WPs and deliverables; interface with external governance bodies.	Coordinate the Governance Board Ensure documentation and communication Act as point of contact for EC/JRC on governance-related matters	Convening and facilitation (not final authority alone)	**(EV ILVO)** and WP7 project management team (SC - **MU**, TM)

Decision Making Processes

Decision-making within the SoilWise governance framework adheres to four core principles that guide both day-to-day coordination and strategic planning: **transparency, inclusiveness, accountability, and consensus orientation**.

Transparency: Governance processes, decisions, and changes are clearly documented and shared with all partners through official meeting minutes, internal reports, and shared documents in collaborative tools such as GitHub or the project SharePoint. These decisions are primarily made during the monthly Executive Board (ExBo) meetings, where Work Package leaders, task leads and use case leads convene. If governance issues are raised, the meeting will be used to discuss updates, proposed changes, or cross-WP concerns. Written follow-up and asynchronous consultation, when needed, allow all partners to provide input. This process reflects the change management flow defined in D7.1, where any proposed change must be clearly identified, evaluated, validated, and logged to ensure traceability and project-wide alignment.

Inclusiveness: All partners in the consortium have equal voting rights in governance decisions. Input is actively sought from technical leads, user leads and the partners liaison with the EC bodies, to ensure that decisions reflect the full diversity of perspectives and needs. Formal decisions follow a majority voting mechanism, but the aim remains to reach shared solutions that accommodate all interests and do not result in negative impacts on any single actor. Before validation, each change proposal undergoes an impact assessment that considers scope, cross-WP effects, and relevance for stakeholders, following the procedures defined in D7.1.

Accountability: Clear roles and responsibilities are in place to define who makes decisions and who implements them. The Governance Board holds authority for all major decisions related to strategic alignment, stakeholder engagement, and compliance with EU policies. Technical decisions, such as those related to standards, system architecture, and data workflows, fall under the remit of WP2, WP3, and WP4 leaders. WP5 and WP6 act as intermediaries with users and stakeholders, ensuring that external feedback loops are respected. The Project Coordinator (EV ILVO) ensures overall integration and, together with the WP1 lead and WP7 project management team, maintains oversight of governance documentation and version control. Any change that affects multiple WPs must follow the formal change validation and documentation process defined in the Project Management Handbook.

Consensus Orientation: The governance model favours consensus through open discussion, co-creation workshops, and continuous dialogue within the Consortium and ExBo. When consensus cannot be reached, a two-step resolution mechanism is applied. First, the Governance Board deliberates based on the documented input and impact assessments and proceeds with a formal vote, applying the majority rule. If disagreement persists, particularly when legal, institutional, or ethical issues are involved, the case is escalated to the Advisory Panel, which includes representatives from JRC, DG AGRI, and REA. Their role is to provide independent recommendations. In the post-project phase, any remaining decision-making authority will be assumed by the Joint Research Centre (JRC), in line with its role as custodian of the European Soil Observatory (EUSO). The advisory panel role can be redesigned to include other organisations, such as DG AGRI, DG ENV, EEA, other stakeholders to EUSO.

4.2.3 Data & Knowledge Sharing and Interoperability Guidelines

As an integral part of the SoilWise governance model, dedicated guidelines for (meta)data sharing and interoperability are being developed to ensure that all soil-related data and knowledge metadata managed within the repository adhere to high standards of transparency, usability, and cross-platform compatibility. These guidelines operationalise the FAIR principles and align with European and international standards. These guidelines focus primarily on metadata ingested by SWR, as evidence of related data and knowledge.

The FAIR principles are applied throughout the SoilWise ecosystem (D2.5, D2.6). Data must be findable through the persistent identifiers and standardised metadata schemas used that enable indexing, cataloguing, and machine-readable search. Metadata records are exposed through standardised APIs and harvesting mechanisms to support discoverability. Accessibility is in line with the information provided by data providers, addressed through open protocols and clear access policies, with differentiated access levels for open, restricted, and sensitive datasets. All metadata remains accessible even for non-public datasets to ensure transparency and traceability.

Interoperability is supported at both syntactic and semantic levels. SWR aligns with recognised technical standards such as the INSPIRE Directive and the ISO 19100 series, ensuring harmonised metadata structures and spatial data delivery. Data formats such as JSON, RDF, and GeoJSON are employed for machine readability. Metadata elements follow established schemas including Dublin Core and INSPIRE profiles, enabling cross-domain compatibility and integration with broader EU data ecosystems.

Semantic interoperability is a key component of the governance model. While specific vocabularies and ontologies for soil are still under review, several established and widely accepted resources are being evaluated, including INSPIRE soil thematic codes, AGROVOC, GEMET, ISO soil-related ontologies (ISO 19156 and ISO 28258) and GloSIS Web Ontology and vocabularies, and classifications such as the World Reference Base for Soil Resources (WRB).

SoilWise will introduce a vocabulary management mechanism to oversee the selection, versioning, and application of controlled terms. This mechanism will include proof-of-concept support for mapping tables between selected vocabularies, enabling semantic harmonisation across data sources. The soil knowledge and expertise required for this is sourced within the project consortium but primarily also in other Mission Soil projects. The testing and application of the vocabularies and vocabulary guidance is also undertaken in collaboration with other Mission Soil projects to ensure easy to use and useful resources and adequate governance on soil vocabularies. The governance model ensures that semantic consistency is maintained across metadata records, supporting better data quality, discoverability, and reuse - also in contexts such as AI-enabled services or automated knowledge inference.

Licensing and usage conditions are also embedded into the governance framework. If possible, displayed metadata include clear, machine-readable licensing information. Data providers retain control over how their data is accessed and reused, in line with the principles of data sovereignty and the legal requirements of the GDPR, Data Act, and Data Governance Act (see 4.2.4). Licensing information is captured directly in metadata to enable filtering and decision-making by data users.

These guidelines are not static but are designed to evolve over time and align with the future governance and technical integration of SWR into EUSO. All data sharing rules, metadata structures, and semantic components are being developed with compatibility in mind. The governance model anticipates the reuse of SoilWise assets within broader infrastructures such as EOSC and the European Soil Data Space. As such, SoilWise follows a forward-compatible design, ensuring that technical and semantic interoperability, licensing clarity, and FAIRness are not just principles, but enforceable governance practices embedded into the system's architecture and operations.

4.2.4 Compliance, Data Security, and Privacy Frameworks

The SoilWise governance model includes a dedicated compliance and security framework that ensures all activities related to metadata harvesting, integration, and reuse are conducted in alignment with EU legal and ethical standards. This framework balances openness and transparency with data protection and provider sovereignty, recognising that metadata may still carry sensitive or regulated information. As the SWR harvests only metadata, and not primary data, the model focuses on secure metadata management.

The framework is fully aligned with the relevant European legislative, including the **General Data Protection Regulation** (GDPR), the **Data Governance Act** (DGA), the **Data Act**, and the evolving **AI Act**. These laws provide the legal foundation for ensuring that any personal or sensitive metadata are handled appropriately. In line with these regulations, SoilWise defines a classification scheme for metadata sensitivity that distinguishes between open, restricted, and confidential metadata objects. This classification guides the level of visibility, reuse conditions, and is captured directly in the metadata records.

To secure metadata assets and prevent unauthorised access or misuse, the governance model defines a set of technical and organisational safeguards. These include:

- Role-based access control for managing who can ingest, modify, or view metadata
- Encryption of sensitive metadata during transmission and storage
- Logging of all access and administrative operations for traceability

Metadata itself may contain personal data and might indirectly reference information that could be considered sensitive—particularly when linked to specific farms, regions, or economic activities. Therefore, the framework adopts a cautious approach, encouraging data providers to anonymise or aggregate metadata elements where there is a risk of re-identification. The SoilWise guidelines also recommend avoiding the inclusion of unnecessary granularity in metadata when it could compromise data subjects or expose commercially sensitive insights.

The governance model also addresses the ethical and legal considerations associated with the integration of AI-driven services, including semantic search, metadata enrichment, and natural language querying. SoilWise commits to transparency-by-design principles, ensuring that users are informed when interacting with AI components and that outputs are traceable, auditable, and validated before being presented as authoritative.

All security and compliance measures are designed to be compatible with the planned integration of the SoilWise Repository into the EUSO. This includes alignment with EUSO's data classification, authentication, and

incident response protocols. Governance elements such as metadata access control, licence tagging, and semantic alignment are developed in collaboration with EU-level infrastructures to ensure long-term coherence.

4.2.5 Knowledge management governance principles

While knowledge and data are often discussed as separate topics, there are clear relationships and many overlaps between knowledge management and data management. The content we consider knowledge, or containing knowledge (e.g. reports, videos, infographics etc.), is generally less structured and the associated standards are less strictly defined. Nevertheless, like with datasets, it is common practice to describe the content of knowledge assets through metadata and to deposit these in repositories. Moreover, the FAIR principles apply to knowledge assets as much as to data. To make knowledge Reusable, it is essential that it is Findable and Accessible and, as far as applicable, Interoperable. Also, knowledge in the form of semantics (e.g. expressed in vocabularies) is a way to improve the FAIRness of both data and (unstructured) knowledge and even allows the interlinkage of semantically related data and knowledge assets.

It is therefore crucial to implement knowledge management as a foundation for the functioning of the SoilWise repository as a data and knowledge hub for stakeholders that want to share and reuse soil health data and knowledge. The ISO 30401 standard for knowledge management is a recognized standard for setting up knowledge management systems for organisations. Its concepts will be used by SoilWise as guiding principles to develop a knowledge management strategy. Here, our KM strategy aims to address the lifecycle of knowledge assets including their creation, validation, publication and maintenance to ensure that the repository remains up-to-date and useful over time.

SoilWise work on the knowledge management strategy and guidelines, and discussions on its concepts and their implementation are just starting. From the perspective of ISO 30401, the following aspects need to be assessed and integrated in a KM strategy that can be deployed:

- Context of the organization, its stakeholders and knowledge needs
- Leadership commitment and KM policy adoption
- Setting objectives and identifying opportunities and risks
- Implementation of KM processes and their support and integration into the organisation
- Monitoring, evaluation and improvement

As ISO 30401 focusses on organisations, a critical issue is to decide what we see as “the organisation” in SoilWise. This is crucial, as it defines the scope of processes, but more importantly, because ISO 30401 presumes leadership commitment. Any knowledge management system is useless if not adopted, fostered and encouraged at the executive level. Where it concerns the scope of the knowledge management strategy and guidelines to be developed by SoilWise, it seems logical to start from the context of the Mission Soil and its ecosystem of providers, users and managing organisations. What also follows from this ecosystem perspective is the fact that the SoilWise repository is only one component in the whole ecosystem and the knowledge management processes that are in the scope of control, and under responsibility of SoilWise can only function well in a larger context, such as the Mission Soil, the Mission Soil Cluster on Knowledge and Data Management, EUSO and related European and other soil stakeholders, the EOSC. SoilWise can propose a strategy and guidelines for this larger context, but it’s implementation and deployment go beyond the project’s tasks and require ownership on another level. Also, beyond structural and procedural measures, fostering a culture of collaboration and knowledge sharing is essential, encouraging community engagement, and recognition mechanisms through active participation by stakeholders. E.g., to maximize its value, the SWR will align with relevant external national and international knowledge initiatives (e.g. EJP SOIL, the INSPIRE directive), thereby supporting broader semantic and institutional interoperability.

4.3 Application of Governance Principles in the SoilWise project

While SoilWise provides the foundational strategy and governance guidelines for FAIR data and knowledge management, the actual implementation and long-term enforcement of these principles go beyond the remit of the SoilWise consortium and even EUSO. Realising the vision of an interoperable, trusted, and widely adopted soil data ecosystem requires commitment from data users, national institutions, and European bodies. In particular, the operationalisation of FAIR principles and stewardship of shared knowledge must be co-owned by actors across the ecosystem, including public authorities, Mission Soil projects, research organisations, and the European Commission. Ensuring long-term impact thus depends on clear institutional ownership and the integration of governance responsibilities into EU-wide data and infrastructure strategies.

The SoilWise governance model is built upon a solid foundation of three key frameworks: the **OpenDEI design principles**, the **FAIR data principles**, and the **ISO 30401 Knowledge Management standard**. While these frameworks were introduced in Section 4.1, this section describes how they are practically applied across the governance model, with a focus on collaboration mechanisms, data sharing, interoperability, compliance, and stakeholder engagement as described in Sections 4.2.1–4.2.4.

Operationalising OpenDEI Principles in SoilWise

The OpenDEI framework provides foundational guidance for designing trusted, open, interoperable, and value-generating European data spaces, with embedded data sovereignty and ethical safeguards. In SoilWise, these principles guide the architectural, legal, and collaborative choices in the governance model.

Table 3 OpenDEI Principles in SoilWise

Open DEI Principles	Application to SoilWise
Openness	Governance structure includes a multi-stakeholder collaboration framework (4.2.1) that ensures inclusiveness of data providers, users, public authorities, and intermediaries. Decision-making is transparent and traceable via documented ExBo meetings on a monthly basis and advisory panel inputs gathered periodically during the year with continuous follow-up (4.2.2).
Interoperability	Data sharing relies on technical standards such as **INSPIRE**, **ISO 19100**, **RDF**, **JSON**, and use of semantic vocabularies (4.2.3). Technical operators ensure system compatibility and integration with EUSO and other EU-level infrastructures.
Sovereignty	Data providers retain control by defining who can view, edit, or manage their metadata records through role-based access control, clear data usage policies, and licensing schemes. Sovereignty is preserved in metadata tagging and governance workflows (4.2.3).

Trust	Trust is built through embedded legal compliance (GDPR, Data Act, Data Governance Act), privacy-by-design measures, and incident response protocols (4.2.4). The governance model ensures structured input from the JRC, REA, and DG AGRI to maintain institutional accountability.
Value Creation	SoilWise facilitates access to datasets and enables innovation through harmonised and enriched metadata, making soil data usable for research, policy, and AI applications. Demonstrator use cases showcase pathways to reuse (D5.3) supported by feedback from end users and pilot activities.

Embedding FAIR Principles in SoilWise Data Management

The FAIR principles (Findable, Accessible, Interoperable, and Reusable) guide how SoilWise handles soil data from ingestion to publication. These principles are critical to enable cross-border, cross-sectoral, and cross-scale reuse of soil data aligned with the EU Soil Strategy and SML.

Table 4 FAIR principles in SoilWise

FAIR Principles	Application to SoilWise
Findable	SoilWise harvests, organizes and displays metadata of relevant existing and new data and knowledge. Moreover, semantic indexing, persistent identifiers, and harmonised data structure improve cross-system data discoverability across Europe. The SoilWise-developed tools as well as snapshots of ingested metadata records are regularly uploaded to Zenodo.
Accessible	All datasets follow open-access policies unless restricted by privacy/sensitivity. Access is granted via open APIs and platform dashboards with clear usage terms (4.2.3). Metadata includes links to source repositories where applicable.
Interoperable	The SoilWise platform integrates data via standard formats (**JSON**, **RDF**), geospatial services (OGC, Open Geospatial Consortium), and semantic alignment with vocabularies like **AgroVoc** and **ISO ontologies** (4.2.3).
Reusable	Licensing schemes clarify usage rights. Metadata includes provenance and versioning. The system promotes harmonisation with national datasets for long-term reuse.

ISO 30401 Knowledge Management in SoilWise

ISO 30401 provides a structured framework for managing, sharing, and co-creating knowledge assets. In SoilWise, this framework informs how knowledge is curated, exchanged, and used across the ecosystem.

Table 5 ISO 30401 Knowledge management principles in SoilWise

ISO 30401 Principles	Applied Practice in SoilWise
alignment with organisational culture and objectives	Governance design incorporates regular discussions and feedback with the organisational ecosystem, EC DGs, Mission Soil. Governance process anticipates transition to JRC-led EUSO governance (see Section 6), ensuring continuity of stewardship and iterative improvement.
Co-creation and learning	Governance bodies (Table 2 in 4.2.2) define clear roles for coordination, technical operations, and user engagement. Escalation paths exist for conflict resolution. Governance is refined per cycle (3x). Use case specific demonstrations allow co-creation with stakeholders and incorporating learnings into next iteration. Feedback loops from WP4 (tech), WP5 (user cases), and advisory panels ensure adaptation.
monitoring and evaluation for continuous improvement	The Stakeholder Assembly and user case feedback channels (WP5) enable co-creation and dialogue across groups, where iterative validation supports a learning system (5.2). SoilWise M&E procedures inform on progress and opportunities for improvement.

Cross-Cutting Application of Governance Principles in SoilWise

The SoilWise governance model is not a mechanical implementation of parallel principles, but rather a dynamic system where **OpenDEI**, **FAIR**, and concepts taken from **ISO 30401** interact across technical, organizational, ethical, and legal dimensions. These principles are applied in complementary ways throughout the repository's architecture and operations, from metadata design and licensing schemes to stakeholder engagement and system evolution. In addition to these core design frameworks, the governance model embeds key European legal instruments such as the **GDPR**, **Data Act**, **Data Governance Act**, and **AI Act** to ensure full regulatory compliance, trustworthiness, and long-term alignment with EU soil and data policy. Table 6 highlights how these intersecting principles are implemented across critical governance components, illustrating the synergies that make the SoilWise governance model both robust and adaptable.

Table 6 How governance principles are applied in SoilWise

Governance element	Principles and Frameworks	How is it applied in SoilWise
Multi-Stakeholder Collaboration	OpenDEI, ISO 30401, FAIR	Fosters inclusiveness, shared ownership, and co-creation through transparent processes and open participation.
Interoperability Architecture	FAIR, OpenDEI, INSPIRE, ISO 19100, JSON, RDF, AgriVoc	Ensures that SoilWise data is interoperable across systems via technical and semantic standards.
Licensing and Data Sovereignty	OpenDEI, FAIR, Data Governance Act, Data Act, ISO 30401	Balances openness with provider control, defining who can access and reuse data under what conditions.
Legal Compliance & Trust	GDPR, OpenDEI, FAIR, Data Act, AI Act, ISO 30401	Builds user trust through legal safeguards, ethical AI use, role-based access, and embedded data protection.
Feedback and Continuous Improvement	ISO 30401, OpenDEI, FAIR	Enables governance learning cycles through structured feedback, stakeholder engagement, and metadata refinement.
Handover to EUSO	OpenDEI, FAIR, ISO 30401, INSPIRE, Data Governance Act	Secures long-term sustainability by aligning with EU data space governance and ensuring structured knowledge transfer.

4.4 Governance Roadmap towards version 2

The governance model outlined in this deliverable represents the first implemented version, designed to align with SoilWise's objectives, stakeholder expectations, and the EU's evolving data and soil health policy framework. However, governance is not static; its continued relevance depends on adaptability, continuous feedback, and long-term institutional integration.

To ensure these needs are met, the project foresees a structured update process that culminates in **Deliverable D1.6 – Repository Governance Model v2**. The roadmap below outlines key governance activities planned across the three SoilWise development cycles, highlighting responsibilities, feedback mechanisms, and alignment milestones with broader EU data governance frameworks, particularly the integration into the European Soil Observatory (EUSO).

This roadmap also reflects how insights gathered through user case demonstrations, advisory panels, GitHub issue tracking, and evolving legal/policy frameworks will progressively shape and refine the governance model.

Table 7 Roadmap towards final SoilWise GM

Iteration Cycle	Planned Action	Responsible	Linked Sections
Cycle 1 (M1–M18)	Establish core governance structure (board, roles, decision-making), initiate GitHub tracking	WP1, WP7	4.2.1–4.2.2
	Conduct baseline stakeholder engagement via workshops and validation meetings	WP5, UC leads	3.1, 4.2.1
	Draft initial compliance and data/ knowledge sharing guidelines	WP2, WP3	4.2.3–4.2.4
Cycle 2 (M19–M30)	Refine governance based on UC validation and GitHub feedback	WP5, WP4, UC leads	3.2, 5
	Align KM and data strategies with governance principles (T2.4, T3.4)	WP2, WP3	4.2.3, 4.2.5
	Begin dialogue with JRC on EUSO integration path	WP4, WP7	4.2.2, 6
Cycle 3 (M31–M42)	Update and consolidate all governance elements in final version (D1.6)	WP1, WP7	4
	Define institutional commitments and handover protocols to EUSO	WP7, JRC	6
	Conduct final governance evaluation workshop	WP1, WP4, WP5, Stakeholder Assembly	5

This roadmap will guide partners in aligning development, engagement, and evaluation activities with the governance system, helping ensure that by Month 42, SoilWise delivers a future-ready, stakeholder-endorsed model suitable for long-term institutional adoption.

5 Monitoring and evaluation

A governance model is only as effective as its ability to adapt, respond, and evolve. In SoilWise, monitoring and evaluation (M&E) are embedded as core functions of the governance framework, ensuring that the system remains responsive to stakeholder needs, compliant with emerging policies, and aligned with the evolving technical landscape. M&E is a continuous learning mechanism, crucial for building trust, validating decisions, and sustaining long-term relevance.

Purpose and Importance

The primary purpose of monitoring and evaluation is to support adaptive governance, a system that can change in response to what is learned from implementation. In a multi-actor initiative like SoilWise, this is essential. The diversity of stakeholders, the complexity of soil data, and the anticipated evolution of European soil data and AI legislation make it impossible to rely on static rules or one-time decisions.

M&E also plays a key role in building stakeholder confidence. By providing transparent evidence of how feedback is collected, considered, and acted upon, SoilWise demonstrates that it is not just a technical repository but a participatory infrastructure. The visibility of governance improvements over time reinforces a culture of openness and accountability, strengthening stakeholder commitment to contribute and reuse data.

What Is Being Monitored

Monitoring in SoilWise addresses both process performance and impact outcomes. On the process side, it evaluates the inclusiveness, responsiveness, and consistency of governance practices. On the impact side, it examines how these practices influence repository usability, stakeholder engagement, and long-term adoption.

Key aspects include:

- **Stakeholder engagement**, in terms of both the number and diversity of contributors actively participating in governance-related activities. This includes data providers, data users, and intermediaries. While their roles and responsibilities are described in earlier chapters, their engagement will be continuously monitored across project cycles.
- **Responsiveness to feedback**, primarily tracked through the SoilWise governance GitHub repository, which serves as the main space for proposing updates, logging issues, discussing improvements, and documenting decision outcomes.

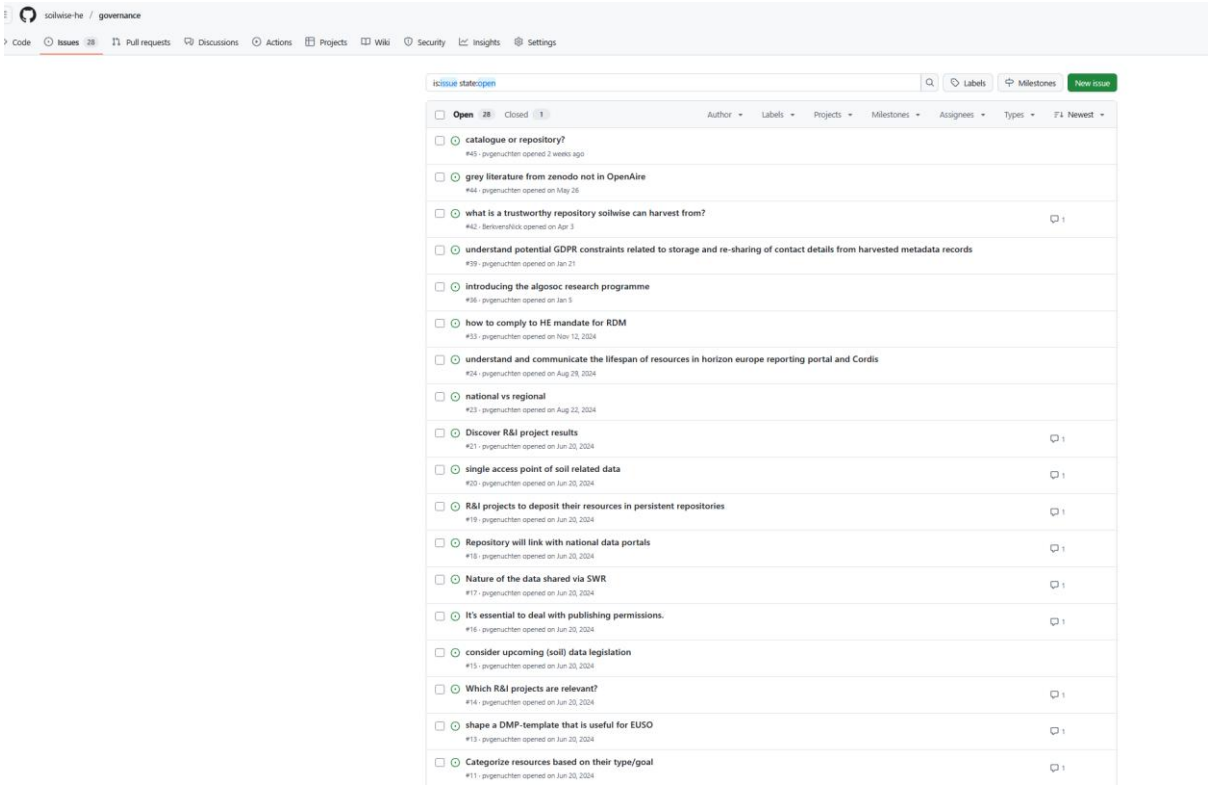

Figure 7 SoilWise Governance Github Repository

- **The rolling plan** (D1.1), which acts as a dynamic catalogue of known or emerging influences that may affect governance. This living document is reviewed and updated at regular intervals and serves as a bridge between operational insight and governance decision-making.
- **Frequency and quality of governance updates**, assessed through version-controlled documentation, issue tracking on GitHub, and internal review of whether user needs are being effectively integrated into refinements.
- **Impact on repository adoption and usability**, evaluated through partner feedback, user case experiences, and evidence of how governance-related clarity such as licensing, data rights, and interoperability guidance supports or hinders use of the platform.

Together, these dimensions provide a holistic view of how well the governance model performs and where targeted improvements are needed.

Monitoring Methods and Tools

SoilWise applies a mixed-method approach to capture both quantitative metrics and qualitative insights. GitHub activity, issue resolution times, and participation counts offer structured data, while interviews, feedback sessions, and collaborative review workshops help uncover deeper perceptions and challenges.

The governance GitHub repository plays a central role in this system. It functions not just as a technical interface, but as a transparent, accessible, and collaborative space for recording the governance history of SoilWise. Proposed changes are tracked through GitHub issues, discussions are openly documented, and release notes and changelogs ensure that decisions are visible and traceable.

Additional insight comes from continuous engagement with WP5 (user cases) and WP4 (technical development), which provide real-time feedback on the practicality of governance measures. Annual review sessions allow structured reflection across the consortium and may be preceded by short partner surveys or bilateral interviews to capture broader input. Strategic stakeholders such as the JRC, REA, and DG AGRI, potentially DG ENV, will also be consulted at key points to validate policy alignment and anticipate future integration with EUSO.

All governance-related documents such as the data strategy, knowledge management strategy, rolling plan, and licensing protocols are versioned, traceable, and centrally maintained to ensure full transparency and accountability over time.

Responsibilities and Coordination

Responsibility for coordinating M&E lies with EV ILVO as Task 1.5 lead and project coordinator. They are supported by work package leads, who help synthesize input from their domains, manage issue resolution processes, and moderate the governance GitHub repository.

User case and technical leads are expected to escalate feedback related to bottlenecks or misalignments, particularly where such challenges are not technical but stem from governance gaps. Advisory panels, while non-binding, provide a strategic perspective. Their role includes helping to shape governance improvements in line with long-term EUSO integration and emerging policy directions.

Integration with the Project Lifecycle

M&E is fully embedded in the SoilWise development cycles. At the end of each cycle, a dedicated evaluation checkpoint is used to formally assess governance performance and determine whether refinements are needed. These checkpoints are structured but flexible and are seen as collective reflection moments, where technical leads, user representatives, and coordination teams jointly assess whether governance mechanisms are still fit for purpose.

For example, after the user case demonstrations and technical integration, partners may raise concerns related to licensing ambiguities, metadata misalignment, or onboarding challenges. These issues are discussed within GitHub, categorized in the rolling plan, and, if needed, resolved via consensus or escalated to the Governance Board or advisory panel. Outcomes from these evaluations directly inform updates to governance documentation and may lead to revised standards, clearer guidance, or improved tools.

The results of this iterative monitoring process will feed into the development of Deliverable D1.6, Repository Governance Model version 2, scheduled for Month 42. This updated version will reflect accumulated learning from across the project, respond to stakeholder feedback, align with updated EU policy and legal frameworks, and support the long-term transition of SoilWise governance under the custodianship of the European Soil Observatory.

By embedding monitoring and evaluation throughout its lifecycle, SoilWise ensures that governance remains a living, participatory system capable of evolving with the needs of its users and the broader policy environment it aims to support.

6 Sustainability and Handover Plan

Ensuring the long-term sustainability of the SoilWise governance model is critical to safeguarding the project's legacy and supporting the continuity of its outcomes beyond the lifetime of the Horizon Europe funding. Governance is not only a foundational component of SoilWise's infrastructure but also a key enabler for continued trust, stakeholder participation, and alignment with evolving European soil policy. This chapter outlines the initial vision for sustaining and transitioning governance responsibilities, with a detailed roadmap to be developed and finalized in Deliverable D1.6 – Repository Governance Model version 2 (Month 42).

Outlook: Future Integration into EUSO

The governance model has been designed from the outset with future integration into the European Soil Observatory (EUSO) in mind. This alignment has influenced the selection of principles (OpenDEI, FAIR, ISO), the design of multi-stakeholder engagement structures, and the legal and ethical safeguards implemented around data access and sovereignty.

Following project completion, the Joint Research Centre (JRC) is expected to assume formal stewardship of the SoilWise platform, including its governance model and technical operations. This transition would position SoilWise as a trusted, pre-integrated component of EUSO, contributing to the long-term infrastructure supporting the SML and the broader EU Soil Strategy.

Transition Path (High-Level Roadmap)

The handover process is expected to be initiated and operationalized during the final project year, between **Month 40 and Month 46**. While D1.6 will contain the full roadmap, the following enabling actions are already anticipated as necessary for a successful transition:

- **Alignment with EUSO's stakeholder structures** to ensure that governance processes remain inclusive, transparent, and policy-aligned after integration. This may involve adapting existing roles and forums to fit within JRC-led governance mechanisms.
- **Transfer of key governance artefacts**, including the latest governance documentation, issue logs from the GitHub repository, vocabulary and metadata registries, and legal templates. These will ensure institutional memory is preserved and accessible.
- **Ongoing dialogue with JRC and DG AGRI**, potentially DG ENV for the SML and EU Soil Strategy, for aligning project outputs with long-term European goals. This coordination will be essential for validating the final governance configuration and clarifying expectations for future maintenance and evolution.

These transition activities will be coordinated alongside the technical and operational integration efforts described in WP4 and WP7.

What Will Be Included in D1.6

Deliverable D1.6 will serve as the conclusive version of the SoilWise governance model, fully updated based on validation feedback, stakeholder consultations, and legal developments. It will include:

- The final version of the governance framework, including all principles, roles, processes, and decision mechanisms refined through project experience and stakeholder feedback.
- A set of institutional commitments, describing which entities (e.g., JRC, national agencies, partner institutions) are expected to carry forward specific responsibilities beyond the project lifetime.
- A comprehensive technical and administrative integration roadmap, detailing how SoilWise governance processes, systems, and assets will be migrated into the EUSO context, including timelines, contact points, and continuity arrangements.

Together, these elements will provide the basis for a smooth and successful handover of SoilWise governance to its long-term institutional home, ensuring that the platform and its collaborative principles continue to serve European soil health and data policy well beyond the project's end.

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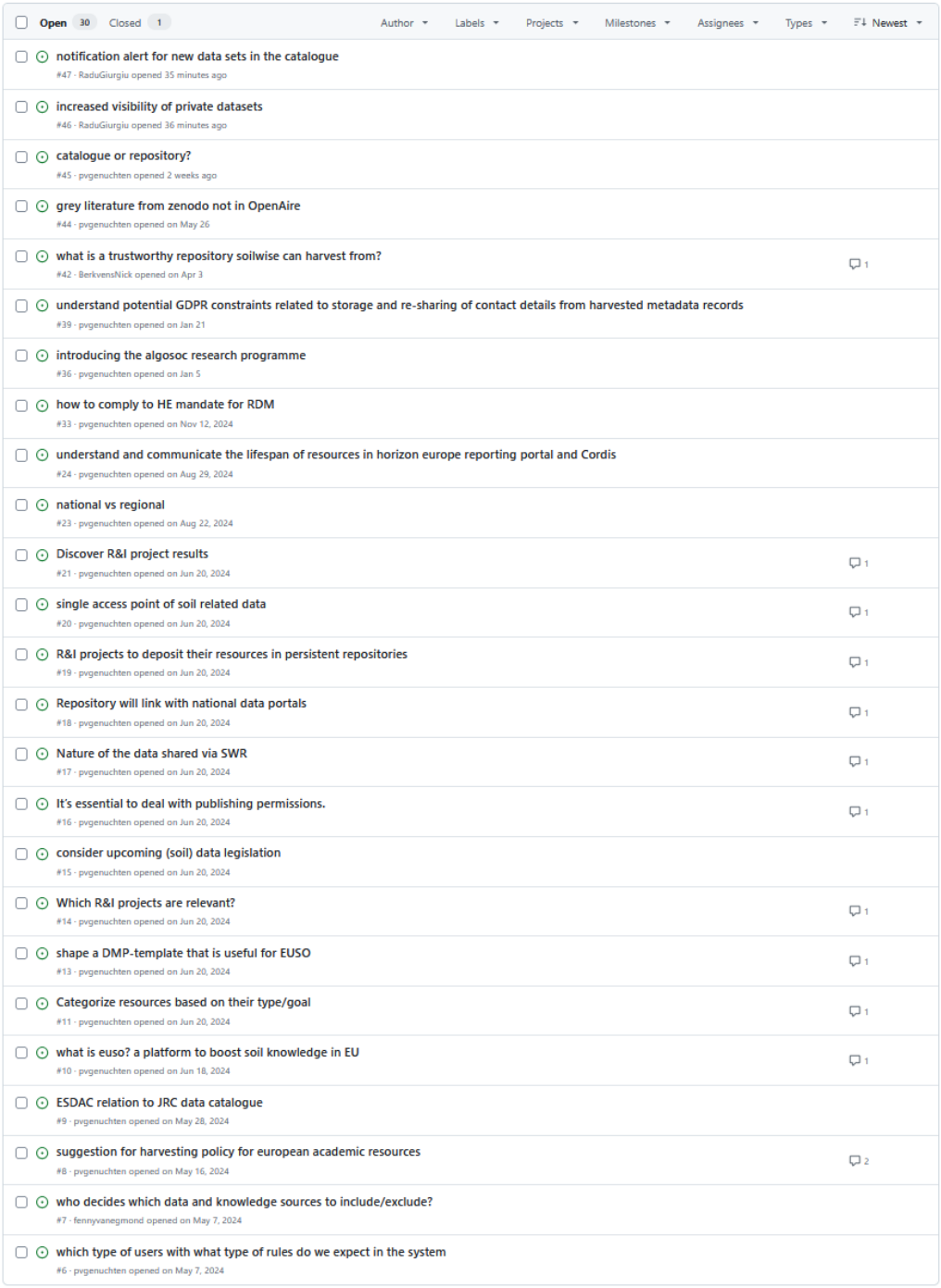
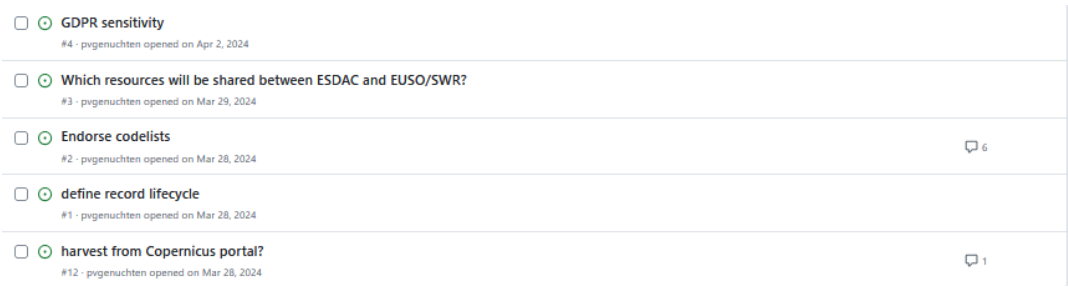
8 Annexes

Annex I – SoilWise Github Governance Repository (date of publishing the deliverable)




GDPR sensitivity
#4 · pvgenuchten opened on Apr 2, 2024
Which resources will be shared between ESDAC and EUSO/SWR?
#3 · pvgenuchten opened on Mar 29, 2024
Endorse codelists
#2 · pvgenuchten opened on Mar 28, 2024
6
define record lifecycle
#1 · pvgenuchten opened on Mar 28, 2024
harvest from Copernicus portal?
#12 · pvgenuchten opened on Mar 28, 2024
1

Annex II – How to Use the Governance Model Document

This quick guide helps SoilWise partners use D1.5 as a living reference.

For Project Coordinators & WP Leads:

- Refer to **Chapter 4** to understand governance roles and decision-making protocols.
- Use **Table 2 (4.2.2)** to clarify your responsibilities in the Governance Board or Working Groups.
- Align your task activities with the compliance and interoperability guidance (4.2.3, 4.2.4).

For Technical Teams (WP2, WP3, WP4):

- Follow standards and vocabularies in 4.2.3 to ensure metadata, APIs, and formats are aligned.
- Use the GitHub Governance Repository to track governance issues.

For Use Case Leads (WP5):

- Engage stakeholders through the Stakeholder Assembly structure (4.2.1).
- Report feedback and conflicts via GitHub or directly to the Governance Board.

For All Partners:

- Submit issues, suggestions, or improvements to: https://github.com/soilwise-he/governance/issues
- Use Chapter 5 to understand the M&E logic and how feedback is processed.
- Consult Chapter 6 for sustainability and transition planning.

Next update: D1.6 (M42) will include the refined version and full handover roadmap.