

Data Spaces In Precision Agriculture:

DS2: DataSpace, DataShare 2.0

WP7, UC3: Precision Agriculture

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PANGAEA R&D

ΕΛΟΤ EN ISO 9001:2015, Cert.:291223-



Introduction - our Activities

Pangaea R&D is a pioneering startup company dedicated to transforming agriculture through cutting-edge precision technologies.

With a strong focus on:

- ▶ **Innovation**
- ▶ **Cross-Section Collaboration & Technology Transfer
Towards Sustainability**

we address critical challenges in modern farming by developing

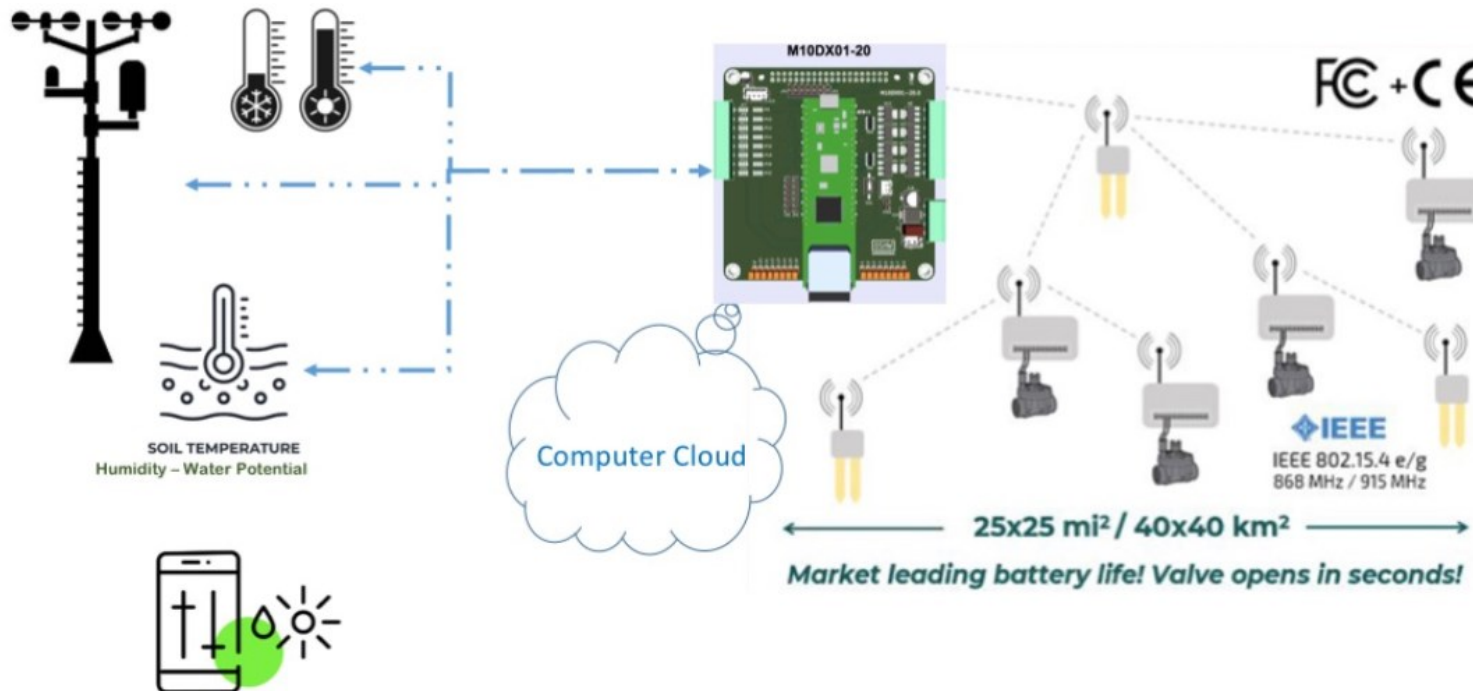
- ▶ **Adaptable**
- ▶ **Cost-effective and Scalable solutions**
worth investing for the end users (acceptable ROI)



Our Mission

As technology providers specializing not only in systems development and installations but also in data management,

- ▶ our mission is to empower farmers and stakeholders to make informed, data-driven decisions



Our Objectives

Innovation & Development

- ▶ Invest in R&D to create advanced precision agriculture technologies to address current agricultural challenges.

Market Penetration

- ▶ Raise awareness and educate farmers about precision agriculture benefits through workshops and demonstrations.
- ▶ Provide training & support towards an effective adoption.

Cross-Sector Collaboration

- ▶ Promote adoption via partnerships with industry leaders, research institutions, and government agencies.
- ▶ Collaborate with tech companies, data providers, and agronomists for building integrated solutions.
- ▶ Technology Transfer - Across Disciplines



Our Objectives

Customization and Scalability

- ▶ Develop **adaptable solutions** for a variety of crops, practices, and regions.
- ▶ Ensure technologies are scalable for large and small farmers.

Data Management

- ▶ Create systems/environments **for collecting, analyzing, and using data** from various sources.
- ▶ **Ensure compatibility** with existing farm management tools,
- ▶ Addressing Regulatory and GDPR Issues.

Economic Viability

- ▶ Develop cost-effective solutions,
- ▶ worth investing for farmers/cooperatives/industries (acceptable ROI).
- ▶ Secure funding and incentives to support adoption.



Precision Agriculture a Multidisciplinary Approach

Precision agriculture is inherently multidisciplinary, by integrating:

- ▶ **Agricultural science:** Understanding crop biology and soil chemistry.
- ▶ **Engineering:** Deploying IoT Infrastructures & Data Management technologies.
- ▶ **Data science:** Analyzing patterns to deliver actionable insights.
- ▶ **Legal and ethical frameworks:** Ensuring compliance and data fairness.

This cross-disciplinary approach ensures a widespread impact:

By fostering innovation **transferring precision agriculture technologies to multiple disciplines.**

By **creating holistic solutions** that benefit not only agriculture but also related industries. (Integrating advancements from diverse fields such as data science, engineering, and environmental science)



Dataspaces: An Evolving Ecosystem

While the **concept of dataspaces** is undeniably at **transformative stage**, we must acknowledge the challenges that come with its adoption.

Many agricultural ecosystems, particularly at the grassroots level, are **struggling with understanding** and **integrating** this innovative framework.

Key Issues Towards Familiarity and Adoption:

1. **Lack of Widely Accepted Tools**
2. **Absence of Systematic Frameworks**
3. **Limited Integration in Funding Programs**

Steps to Address These Challenges:

1. **Development of Standardized Tools**
2. **Push for a Coherent Framework**
3. **Incorporating Dataspaces in Funding Programs**



Dataspaces: An Evolving Ecosystem

Key Issues Towards Familiarity and Adoption

1. Lack of Widely Accepted Tools :

- ▶ There is a noticeable gap in user-friendly, standardized tools designed specifically for the agricultural sector.
- ▶ Farmers and cooperatives often rely on fragmented solutions that are incompatible with the larger dataspace ecosystem.

2. Absence of Systematic Frameworks :

- ▶ At both the national & European levels, there is no unified framework to guide the development, implementation, and governance of dataspaces in agriculture.
- ▶ This lack of direction has created uncertainty, particularly for small-scale farmers and local agribusinesses.

3. Limited Integration in Funding Programs :

- ▶ National (and European funding programs, to some extent) have not fully recognize and integrate dataspaces as a priority area for agricultural innovation.
- ▶ Tools and technologies aligned with dataspaces often face challenges securing financial support, limiting their development and adoption



Dataspaces: An Evolving Ecosystem

Steps to Address These Challenges

1. Development of Standardized Tools

- ▶ We put collaborative efforts to develop **open-source tools** tailored to precision agriculture, ensuring **compatibility and ease of use**.
- ▶ As a startup, we are actively contributing to this by extending existing applications to support **federated learning and interoperable dataspaces**.

2. Push for a Coherent Framework

- ▶ Policymakers must prioritize the creation of a **systematic framework for dataspaces** at the national and EU levels.
- ▶ This **framework should define clear roles, governance structures, and interoperability standards**, enabling seamless collaboration across sectors.

3. Incorporating Dataspaces in Funding Programs

- ▶ The **inclusion of dataspace projects in funding initiatives**, such as the EU's Horizon Europe program or national innovation grants.
- ▶ By **locating funds for dataspaces**, governments and institutions can accelerate adoption and showcase the tangible benefits to farmers and stakeholder



Data Interoperability: Bridging the Gaps

Dataspaces thrive on interoperability, as a cornerstone of DS2.

Our solutions are emphasizing on:

- ▶ **Standardization:** Ensuring sensor data can integrate seamlessly with regional and global datasets.
- ▶ **Cross-sector collaboration:**
 - Uploading data from **groves** to **the intersector dataspace**
 - enables insights that go beyond traditional boundaries,
 - fostering innovation.

This level of interoperability ensures that every stakeholder, from the farmer to the policymaker, speaks the same data language.



Data Governance and Analytics: Building Trust

Data governance is critical to ensure trust and usability. Through DS2, we prioritize:

- ▶ **Transparency:** Farmers retain ownership of their data while contributing to shared pools for collective benefit.
- ▶ **Role-based access:** Stakeholders receive insights relevant to their specific roles, ensuring efficient decision-making.

Our predictive analytics for crop yields and harvest timing

showcasing how

- **governed, high-quality data can provide actionable insights,**
- **reducing risks and maximizing efficiency.**



Security and Legal Compliance

In an era of data breaches, **security is non-negotiable.**

Our cooperative approach is aiming:

▶ **Robust edge processing:**

- By leveraging Federated Learning model (FL) at the gateway level,
- **Sensitive data is processed locally**, minimizing exposure.

▶ **Regulatory alignment:**

- We comply with GDPR and regional laws,
- ensuring that data privacy and ethical considerations remain at the forefront.

Through DS2, we aim to set a benchmark for secure and legally compliant data management in precision agriculture.



Real-Life Demonstration Monitoring Sites

Our demo sites in Greece provides a tangible example of Data Spaces impact:

- ▶ **Technology in action:**
 - IoT sensors managed by wireless gateways collect real-time field data.
- ▶ **Intersectoral sharing:**
 - Data uploaded to the intersectoral dataspace provides insights beyond agriculture, benefiting **logistics, retail, and policymaking sectors.**
- ▶ **Impact:**
 - Farmers can **predict harvest times more accurately, reduce waste, and improve resource allocation.**

Our real life projects exemplifies how dataspaces foster collaboration and innovation.

Conclusion: Empowering the Precision Agriculture Community

Through our collaboration with DS2 stakeholders, Pangea R&D is committed to demonstrating the transformative potential of dataspaces in agriculture:

- ▶ By addressing **interoperability, governance, and security**, we are building an ecosystem where data is not just collected but also shared and used to its full potential.
- ▶ Our real life **crop monitoring projects** are just the beginning. Together, with initiatives like DS2, we can create a future where **precision agriculture is Smarter and Does Matter !**



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Thank you for your attention

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