D 4.11 - Policy Recommendations & Best Practices for Value Chain Actors

Work Package 4 - Observatory Data Collection and Analysis

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Date: 30.06.2025

Policy Brief A: *Public Sector's Role in Enabling Data and Digital Transformation in Agriculture & Forestry*

Funded by the European Union

Full Title	**4Growth** - Digital Agriculture and Forestry: Understanding the Market to Forecast and Support Future Growth			
Project number	101134855		**Acronym**	4Growth
Start date	01.01.2024		**Duration**	36 months
Granting authority	European Research Executive Agency (REA)			
Project Coordinator	STICHTING WAGENINGEN RESEARCH (WR)			
Date of delivery	Contractual	M18	**Actual**	M18
Type	R - Document, report		**Dissemination level**	SEN - Sensitive
Lead beneficiary	[Name of the organisation]			
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Keywords	Digitalisation of Agriculture and Forestry, Data Governance, Interoperability, Public Policies, Public-Private Partnerships, Investment, Skills			

Document Revision History				
Version	**Issue date**	**Stage**	**Changes**	**Contributor**
0.1		Draft	First Outline	WR
0.2	23.05.2025	Draft	First Draft for internal review	WR
0.3	11.06.2025	Draft	Reviewed Draft	AFL, FI
0.4	27.06.2025	Draft	Reviews incorporated – final version	WR
1.0	30.06.2025	Final	Last review and submission	WR

Important note

Deliverable 4.11 - *Policy Recommendations & Best Practices for Value Chain Actors* consists of 2 separate documents:

- ***Policy Brief A:*** **:** Public Sector's Role in Enabling Data and Digital Transformation in Agriculture & Forestry
- ***Policy Brief B:***Unlocking Private Investment and Innovation in Data and Digital Technologies in Agriculture & Forestry – Best Practices

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Executive Summary

Despite its transformative potential, the adoption of data and digital technologies (D&DT) in European Union (EU) agriculture and forestry remains slow and uneven. Public institutions must act both as regulators and enablers, addressing fragmented governance, underdeveloped infrastructure, and investment barriers. This brief presents targeted policy recommendations to create enabling environments for responsible, inclusive, and efficient digitalisation. Policy Brief B (below) complements this brief with private sector best practices, reflecting the dual role of public actors as enablers and private actors as implementers of digital transformation.

Drawing on insights from the 4Growth project deliverables, interviews with key stakeholders (including relevant people from the EU, data intermediaries, and private investors), and complementary deliverables from other EU projects (e.g. AgriDataSpace, QuantiFarm, FoodScaleHub, and MEF4CAP), the brief lists recommendations to policymakers and it also aligns proposed actions with EU policy instruments, such as the Common Agricultural Policy (CAP), EU Forest Strategy 2030, Green Deal, and Digital Strategy.

This policy brief identifies the key challenges impeding digital transformation: i) monopolisation of data assets, ii) unclear roles for data intermediaries, iii) lack of semantic standards, iv) limited rural infrastructure, and v) the mismatch between private investment expectations and agri-food sector realities. To address these gaps, the brief provides actionable policy recommendations across five domains:

1. **Investment & Funding Mechanisms**: Expand the CAP funding for digitalisation, develop blended finance tools, and incentivize early-stage investment through innovation loans and tax relief.
2. **Infrastructure & Interoperability**: Invest in federated digital infrastructure, mandate the use of harmonised semantic standards, and support rural connectivity.
3. **Governance & Legal Clarity**: Clarify legal implications of the EU regulations & develop sector-specific provisions on access, fairness, and data governance rules.
4. **Skills & Capacity Building**: Scale digital literacy campaigns, training pathways, and data stewardship roles at the regional level.
5. **Public-Private Partnerships (PPPs)**: Co-invest in platforms, support early-stage PPPs, and ensure neutral governance of digital intermediaries.

Immediate next steps include aligning CAP Strategic Plans with digital key performance indicators (KPIs), funding regulatory sandboxes, and embedding interoperability mandates in EU-funded platforms.

Through coordinated and sustained action, public authorities can create an enabling environment for inclusive and scalable digital transformation in agriculture and forestry.

1. Introduction

The digital transformation of agriculture and forestry is not solely a matter of deploying new technologies, but it is also a governance challenge, an investment imperative, and a test of institutional alignment. While the potential benefits of data and digital technologies (D&DT) in these sectors are widely acknowledged (from enabling precision farming and carbon monitoring to improving transparency and resilience), their uptake across the EU remains fragmented and slow.

This policy brief aims to provide actionable guidance to public-sector actors at both the EU and Member State levels to create enabling environments for inclusive, trustworthy, and scalable digitalisation. It offers recommendations on how to update legal frameworks, design smart investment tools, and build capacity to support farmers, foresters, and farmer cooperatives in navigating the digital transition. This document is complemented by Policy Brief B, which addresses best practices for private value chain actors aiming to support the digital transformation of the sector. This distinction reflects the dual governance logic of digital ecosystems, where public institutions create enabling conditions while private actors drive practical implementation.

The brief draws on findings from the **4Growth project deliverables**, which explore digital uptake through observatories, stakeholder engagement, and scenario-based foresight. In addition, it incorporates **insights from interviews** with policy officials, digital infrastructure experts, and private investors. Lessons are also drawn from aligned EU initiatives such as AgriDataSpace, QuantiFarm, FoodScaleHub, and MEF4CAP.

Central to this brief is the recognition that public institutions play a dual role: they must regulate to ensure fair, interoperable, and ethical digital environments, while also acting as proactive enablers, including investing in infrastructure, coordinating governance, and building trust.

To that end, this brief is framed around four EU policy instruments critical to agri-digital transformation:

- The Common Agricultural Policy (CAP)
- The EU Forest Strategy 2030
- The Green Deal
- The Digital Strategy, including the Data Act and Data Governance Act

By identifying leverage points within these frameworks, the brief supports public authorities in orchestrating digital transformation that is not only efficient and scalable, but also socially inclusive, environmentally aligned, and economically sustainable.

2. Policy Landscape & Challenges

The integration of data and digital technologies (D&DT) into European agriculture and forestry is shaped by a complex, fragmented, and evolving policy landscape. While the EU has adopted several high-level policy frameworks that recognise the role of digitalisation, implementation remains uneven, particularly in rural and resource-constrained regions.

2.1. Fragmented Data and Legal Ambiguities

Companies, which hold big agricultural data sets, treat data as a competitive asset, offering them a strategic advantage. As a result, many emerging agri-tech ecosystems fail to achieve the data liquidity necessary to scale digital solutions, AI tools or enable broad interoperability, especially to the detriment of small start-ups, which require data to train algorithms and develop digital solutions to the market. This competitive logic is compounded by a lack of regulatory clarity, particularly regarding the legal obligations and governance roles of data intermediaries. As highlighted in stakeholder interviews, sectoral stakeholders are unclear about the legal implications of data sharing, particularly concerning the role of data intermediaries. While data spaces are designed to facilitate the exchange of data among actors, many existing isolated 'data lakes'[1] in the agri-food sector, remain closed and proprietary. Many companies are hesitant to participate in data-sharing schemes due to these ambiguities.

2.2. Public-Private Investment Gaps

Digital transformation in agriculture and forestry faces a structural investment barrier. Public funding remains essential, especially in early-stage development. Most venture capital (VC) models are incompatible with the slower return cycles and complex stakeholder landscapes typical in agriculture and forestry. While some instruments exist, their fiscal incentives are often less attractive. Over-reliance on crowdfunding due to financial literacy concerns among retail investors is another issue.

Investment logic is identified across four investor archetypes: VC firms, corporate research and development (R&D), bond investors, and public actors. While VCs are unsuited for infrastructure-heavy investments, infrastructure investors and public funds are better positioned to support long-term platform development. Data's value is only realised at scale, but agri-food markets remain fragmented, with thin margins and low data readiness.

Private actors bring agility and innovation, but without public co-investment, the risk-return profile remains unattractive. This necessitates national specificity in governance, cautioning against a one-size-fits-all model. Local proximity and policy alignment are essential, but the realisation of this is a challenge.

2.3. Interoperability and Semantic Misalignment

Interoperability is a critical barrier. The obstacle lies in the fragmentation of standards and interoperability issues in the agri-food sector. Diverse actors with varying technological capabilities, data standards, and priorities often struggle to collaborate effectively. This fragmentation impedes interoperability and limits the scope of data sharing, particularly across supply chains or national borders. Agricultural products frequently move across EU borders, but it is not necessarily the same in the ag-data setting. Heterogeneous ontologies and data structures hinder seamless data integration. Despite prior investments in technical infrastructure (cloud, digital identities, application programming interfaces [APIs]), many tools remain inaccessible to end-users due to this semantic fragmentation.

[1] This notion is used by one of the interviewees, emphasising that some data sets are large, but disconnected from other data systems.

Without clear, tangible benefits at the user level, digital tools will remain underutilised. A cultural preference for bilateral exchanges and proprietary data control tendencies also undermines the emergence of open, scalable data platforms.

2.4. Structural and Economic Constraints

Beyond financing and interoperability, broader structural constraints inhibit digital transformation across the agri-food and forestry sectors. One of the central barriers is the lack of critical mass and data access. A successful operation in the data-driven solutions market is highly dependent on access to large data sets. Investors often seek growth trajectories that agri-data startups cannot deliver, especially when access to data is controlled exclusively by larger incumbents. This creates a paradox where data is essential for innovation, but its monopolisation prevents the emergence of viable service providers. Data, in isolation, lacks value unless it is aggregated at a scale that allows for meaningful insights and applications. One interviewee stated that "*You need a certain level of volume before data becomes valuable.*"

Also, data is a source of power. Companies use data to gain competitive advantages, such as predicting harvests and market trends more accurately than competitors. Companies, particularly in agriculture and forestry, do not necessarily see the added value of sharing data due to a lack of incentives. Large corporations with monopolistic or oligopolistic control over agricultural data are hesitant to share information with potential competitors. More importantly, market structures that require vertical integration of digital solutions further exacerbate this challenge. Large platform companies and agricultural corporations often treat data as a strategic asset, consolidating control and resisting sharing initiatives.

2.5. Summary of Challenges

The challenges can be summarised as follows:

- **Lack of critical mass due to fragmentation of the agri-food sector:** Diverse actors with varying technological capabilities, data standards, and priorities struggle to collaborate effectively, hindering the full potential of digital transformation in the sector.
- **Investment Risk Mismatch:** VCs require high returns incompatible with agri-data business models.
- **Lack of trust:** Stakeholders are hesitant, particularly due to unclear benefits for farmers and insufficient transparency in data governance.
- **Legal uncertainties:** Many companies are unclear about the legal implications of data sharing, particularly concerning the role of data intermediaries.
- **Absence of semantic interoperability:** Data is not always usable in all systems smoothly due to disparate ontologies and data structures across the EU.
- **Cultural and economic preference:** This limits bilateral data exchanges, driven by the desire to monetise individual data flows, undermining collective data-sharing efforts.
- **Market structures:** Large corporations may have monopolistic or oligopolistic control over agricultural data, making them hesitant to share information with potential competitors.
- **Data as a source of power:** Companies and intermediaries use data to gain competitive advantages, seeking to monopolise data access to generate proprietary value.

- **Lack of incentives:** Companies, particularly in agriculture and forestry, do not necessarily see the added value of sharing data.

In conclusion, digital transformation in agri-food systems faces deep structural constraints. Unlocking its potential requires coordinated legal, financial, and infrastructural reforms. Interviewees agreed that the public sector must play a catalytic role: setting governance standards, de-risking investment, enforcing interoperability, and ensuring equitable access. These systemic interventions are preconditions for unlocking private innovation and scaling sustainable data ecosystems.

3. Policy Recommendations

This section outlines strategic policy recommendations to support the digital transformation of agriculture and forestry in the EU. These recommendations are grouped into five thematic areas that reflect the most pressing enablers identified through interviews, project deliverables, and complementary initiatives. First, addressing investment and funding mechanisms to close the financing gap for digital innovation. Second, focusing on infrastructure and interoperability as essential technical foundations. Third, examining the need for legal clarity and effective governance frameworks. Fourth, highlighting the importance of skills and capacity building to ensure uptake and effective use of digital tools. Finally, exploring how public-private partnerships (PPPs) can drive collaborative innovation while ensuring inclusivity and sustainability.

3.1. Investment and Funding Mechanisms

Unlocking the potential of digital technologies requires a financing ecosystem that aligns with the risk-return profiles of agricultural innovation. This section outlines policy tools ranging from CAP-targeted funds to hybrid financing and tax incentives that can crowd in private capital, de-risk investments, and support digital adoption. Special attention is given to tailoring instruments to diverse investor types and long-term infrastructure needs.

- **Increase CAP Funding for Digitalisation**: Allocate specific funding under CAP Strategic Plans to support digital infrastructure, adoption of digital tools, and public data-sharing services. Funding should prioritise solutions that demonstrably improve environmental sustainability, economic competitiveness, and input efficiency, while also reducing administrative burdens for farmers. Integrate digital key performance indicators (KPIs) within eco-schemes and rural development indicators.
- **Define clear criteria for monitoring digitalisation progress in CAP Strategic Plans**: Support the development of harmonised indicators and guidance, particularly for Result Indicator R.3 on Digitalisation in Agriculture, to enable Member States to consistently track and report their contributions to digital transformation under the Performance Monitoring and Evaluation Framework (PMEF). This effort should build on existing work by the CAP and ensure alignment with national digitalisation targets.
- **Launch Innovation Loans and Hybrid Instruments**: Create co-investment tools that combine public support with private capital. These may include growth capital, repayable grants, and innovation loans tailored to small to medium-sized enterprises (SMEs).
- **Diversify Capital Instruments beyond Equity:** Develop innovation-support schemes such as soft loans, convertible debt, and repayable advances tailored to digital agriculture ventures.

- **Introduce Tax Incentives for Private Investors**: Adapt UK-style SEIS[2] mechanisms or Dutch fiscal incentives to attract early-stage investment[3] in agri-digital startups. These tools should target both high-growth and moderate-growth firms.
- **Tailor Financial Instruments to Investor Types:** Align public-private investment tools with the logic of VC, infrastructure, or impact investors to increase uptake and match risk-return expectations.
- **Support Mission-Driven Research and Innovation:** Strengthen financial support for mission-oriented research in agriculture, forestry, and climate technologies. Promote public-private-citizen partnerships to fund sustainable digital innovation.
- **Use Public Investment to De-Risk Private Capital:** Provide seed funding through EU and national programs to stimulate private follow-on investment in agri-digital infrastructure.
- **Funding Model for Common European Agricultural Data Space (CEADS)[4]:** Support data space infrastructure development through public funding, followed by gradual private co-investment.

3.2. Infrastructure and Interoperability

Digital transformation cannot proceed without a robust, interoperable infrastructure. This section focuses on investments and standards needed to build a federated, inclusive digital architecture aligned with CEADS. It also emphasises rural equity, semantic interoperability, and monitoring tools to ensure that data infrastructure serves both policy and market needs.

- **Invest in Infrastructure and Innovators**: Investments must prioritise technological infrastructure and practical use cases, particularly those that increase farmer revenues or reduce costs. Support the three pillars of digital transformation: technological infrastructure, innovative service providers, and sector-wide capacity building.
- **Support Federated Infrastructure Development**: Align national platforms with CEADS architecture. Ensure that the infrastructure respects semantic and legal interoperability standards.
- **Adopt a Phased Funding Model for CEADS Infrastructure**: Support the development of the CEADS through an initial period of public investment focused on infrastructure and interoperability layers, followed by gradual private co-investment to ensure long-term sustainability.
- **Mandate Use of Standardised Ontologies**: Promote widespread adoption of standards and other reference vocabularies to enable semantic integration across borders. Fund national

[2] The Seed Enterprise Investment Scheme (SEIS) in the UK incentivises investment in early-stage companies by providing generous tax benefits to investors. Under this scheme, investors benefit from substantial income tax relief and exemptions from capital gains tax on any resulting profits. See more at https://www.british-business-bank.co.uk/business-guidance/guidance-articles/finance/what-is-the-seed-enterprise-investment-scheme-seis#

[3] The Netherlands provides several tax-based incentives to stimulate early-stage investment, especially in startups and innovation-driven enterprises. These measures include R&D tax credits, reduced corporate tax rates, and targeted programs designed to promote investment in cutting-edge businesses. See more at https://business.gov.nl/finance-and-taxes/deductibles-and-schemes/all-tax-schemes-for-starting-companies/

[4] CEADS is an initiative aimed at creating a secure, trustworthy, and interoperable digital environment for agricultural data in the European Union. Its primary goal is to facilitate the sharing and access of agricultural data among various stakeholders, including farmers, researchers, businesses, and public authorities, while respecting data regulations. See more at https://ceads.eu/

adaptations and translation efforts. Require interoperability compliance in public funding calls to avoid vendor monopoly effects in digital agriculture ecosystems.

- **Coordinate Unified EU Standards to Enable Interoperability:** Strengthen EU-wide governance to reduce fragmentation and promote harmonised digital agriculture infrastructure.
- **Improve Rural-Urban Technological Equity:** Establish robust policy incentives and funding mechanisms to bridge rural-urban digital divides. Promote equitable access to advanced agricultural and forestry technologies and resources.
- **Prioritise Rural Digital Investment**: Invest significantly in digital infrastructure and services in rural areas to close connectivity gaps and enable equitable access to agri-digital tools.
- **Accelerate Broadband and 5G Deployment in Rural Areas**: Combine CAP, Digital Europe, and national infrastructure programs to close the digital divide in agriculture and forestry regions.
- **Develop Predictive Digital Monitoring Systems:** Implement coordinated digital monitoring and forecasting frameworks to manage climate-induced resource and food crises. Leveraging existing EU assets such as the Copernicus Earth observation programme.[5]
- **Use Digital Monitoring for Climate and Biodiversity Compliance:** Deploy advanced digital tools, including satellite data from Copernicus, to monitor the implementation of biodiversity and climate policies in agriculture and forestry, enabling precision in reporting and enforcement.
- **Develop Open-Access Data Platforms:** Create transparent, interoperable agricultural and forestry data platforms governed by inclusive and fair rules. Ensure public access and stakeholder oversight to increase trust and utility.
- **Safeguard Infrastructure Transparency and Ethics:** Establish transparency and accountability requirements for corporations controlling digital infrastructure in agriculture and forestry.

3.3. Governance and Legal Clarity

Legal certainty and governance transparency are critical to enable trust and participation in digital ecosystems. This section provides recommendations for regulating data access, clarifying intermediary roles, and designing inclusive platform governance aligned with the Data Act and Data Governance Act. It also explores structural safeguards to prevent monopolisation and promote the Once-Only Principle.

- **Regulation of Data Access:** Strong public regulatory intervention and neutral governance can stimulate meaningful data exchange. Actively enforce the EU Data Act and Data Governance Act to foster a fair and competitive agricultural data market, especially for smaller actors and innovators. On top of that, regulate sector-specific access terms, metadata standards, as well as user and data re-use rights. Mandate fair-use policies and platform neutrality to ensure smaller actors and farms have access to essential digital technologies and data services.

[5] Copernicus is the European Union's flagship Earth observation programme, which provides near-real-time global data on the atmosphere, land, oceans, and climate using satellite and in-situ sensors. See more at https://www.copernicus.eu/en

- **Facilitate a Level Playing Field**: Prevent dominant actors from excluding SMEs through open governance models and mandatory access rules. Avoid monopolistic outcomes by ensuring that essential infrastructure remains under public or mixed control. Enforce antitrust rules and regulatory oversight to prevent monopolistic control over agricultural and forestry digital ecosystems.
- **Building a Trustworthy and Functional Digital Ecosystem:** Desing structural interventions. These include regulatory oversight to prevent vendor lock-in, neutral governance for data platforms, and localisation strategies to align digital services with national policies and farmer needs. Public co-investment is essential, not only to finance infrastructure but to establish trust and institutional legitimacy at the national level.
- **Define Legal Roles of Data Intermediaries**: Provide sector-specific interpretation of the Data Governance Act to clarify responsibilities, liabilities, and governance models. Emphasise neutrality and transparency in data transaction facilitation.
- **Enable Sectoral Regulatory Sandboxes**: Fund pilot sectoral programs where new AI tools, consent frameworks, and data-sharing models can be tested under controlled conditions.
- **Governing Data Spaces and Platforms**: Ensure all stakeholders, including large companies, can trust the governance model of shared platforms to support fair participation. Allow Member States flexibility in managing data infrastructures while coordinating through CEADS for interoperability. Promote business models for intermediaries based on facilitation services rather than selling data.
- **Streamline Regulation through Data Spaces and the Once-Only Principle**: Simplify regulatory compliance procedures by applying the Once-Only Principle[6] ensuring that farmers and businesses submit key information only once, while public administrations securely reuse this data across agencies and borders. Agricultural data spaces can operationalise this approach, reducing bureaucratic burdens and increasing compliance efficiency through interoperable, privacy-respecting data exchange mechanisms.
- **Safeguard Neutrality in Decision-Support Systems:** Ensure that public and private agricultural decision-support platforms operate with neutral, transparent governance models that prevent bias and exclusion.
- **Enhance Cybersecurity and Data Sovereignty:** Develop stringent cybersecurity, data protection, and digital sovereignty frameworks to protect agricultural and forestry platforms from threats and lock-in risks. Address digital infrastructure vulnerabilities by developing sector-specific cybersecurity standards for agricultural and forestry data systems.

3.4. Skills and Capacity Building

Digital adoption hinges on human capacity. This section outlines how public authorities can foster digital literacy, co-create user-friendly tools, and train data stewards to help farmers and foresters manage digital transitions. Targeted support for education, certification, and advisory networks is essential to enable long-term uptake.

[6] The EU's Once-Only Principle (OOP) mandates that citizens and businesses submit their data to public administrations only once. After that, public authorities share data securely among themselves, minimising administrative burden and simplifying digital public services. See more at https://commission.europa.eu/news-and-media/news/once-only-principle-system-breakthrough-eus-digital-single-market-2020-11-05_en

- **Digital Literacy Campaigns & Training for Digital Adoption**: Fund awareness programs and hands-on training to improve understanding and trust in digital tools across the agri-food sector. Integrate digital tool use and data governance into formal and informal education systems across Member States. Establish national training and certification pathways.
- **Launch Data Stewardship Programs**: Train trusted advisors, who help farmers manage consent, data quality, and benefit-sharing.
- **Support Development of Practical, Farm-Centric Tools**: Encourage the co-design of digital tools with farmers to ensure usability, impact, and long-term uptake.

3.5. Public-Private Partnerships (PPPs)

Collaborative investment models are key to building shared digital infrastructure. This section explores how public-private partnerships can de-risk innovation, ensure platform neutrality, and match capital instruments to project timelines. By leveraging mission-driven funds and trusted governance, PPPs can scale sustainable data ecosystems.

- **Develop PPP Frameworks for Regional Data Hubs**: Public sector should co-invest in foundational layers (e.g., cloud services, APIs) of data sharing ecosystems, allowing private actors to innovate on service provision.
- **Support PPPs in Early-Stage Data Infrastructure:** Create collaborative funding schemes where the public sector absorbs early risk and enables later-stage private participation.
- **Match Investment Instruments to Capital Profiles:** Build blended investment programs aligned with investor timelines—e.g., bonds for infrastructure, VC for services.
- **Use Public Funds to Catalyse Sustainable PPPs**: Leverage public seed funding to build trust in new PPPs for agricultural data platforms, aiming for mid-term private financial commitment.
- **Ensure Intermediary Neutrality in PPP Projects:** Publicly supported intermediaries must serve all actors equally and transparently to ensure legitimacy in multi-stakeholder settings.
- **Support Mission-Driven Co-Investment Platforms**: Create synergies between InvestEU, national development banks, and mission-oriented funds to de-risk long-term investments in data infrastructure.

4. Conclusions & Next Steps

The digital transformation of agriculture and forestry in the EU is a multidimensional issue that transcends technological innovation. It touches upon legal clarity, investment models, interoperability, skills & capacity building and the structural organisation of markets. As shown throughout this policy brief, realising the potential of digitalisation in these sectors requires targeted and sustained public-sector engagement.

The findings from the 4Growth project, along with insights from stakeholder interviews and aligned EU-funded initiatives, point to several preconditions for success: investment de-risking, regulatory coherence, data governance reform, skills development, and public-private alignment. Interviewees (from the European Commission, venture capital sector, and data intermediaries) highlighted the need for digital tools to be embedded in a fair, user-centric, and interoperable ecosystem.

Crucially, the public sector must embrace its dual role: as a regulator that ensures transparency, neutrality, and market fairness; and as an enabler that co-invests in infrastructure, scales training programs, and builds inclusive governance.

Strategic Imperatives for Public Authorities:

- Anchor digitalisation goals explicitly within the Common Agricultural Policy and the EU Forest Strategy.
- Co-invest in digital infrastructure and ensure semantic interoperability at the national and EU level.
- Provide legal certainty and strong enforcement of the EU Data Act and Data Governance Act and develop sector-specific follow-up provisions.
- Support SME access to necessary data and digital platforms and foster fairness through antitrust oversight and open standards.
- Develop and fund lifelong digital education frameworks, data stewardship programs, and trusted intermediaries.

Immediate Next Steps for Policymakers:

- Allocate digital key performance indicators (KPIs) within CAP Strategic Plans.
- Launch national and regional public-private platforms for CEADS-aligned infrastructure.
- Consider designing sector-specific data access, control, and sharing rules.
- Support the development of harmonised semantic ontologies and data formats across all EU-funded platforms, and develop sectoral interoperability frameworks.
- Fund regulatory sandboxes to pilot AI, consent tools, and data-sharing schemes.
- Implement fiscal incentives (e.g., SEIS[7]-style relief) to attract early-stage private capital.

By acting on these, policymakers can shift from fragmented experimentation to coherent, inclusive, and sustainable digital transformation. The stakes are high, not only for economic resilience and environmental performance, but also for Europe's ability to shape a fair and effective data economy in agriculture and forestry.

[7] See footnote 2 above.

ANNEX: Stakeholder Interview Summary & Methodology

As part of the 4Growth project, semi-structured interviews were conducted with four key stakeholders between March and April 2025. The objective was to capture first-hand insights into the challenges, incentives, and governance needs related to public and private investment in agri-digital transformation. Stakeholders were selected based on their expertise in EU digital policy, agricultural data platforms, and investment in the agri-food innovation ecosystem.

The interviews followed a semi-structured format, allowing for in-depth discussion around five thematic areas:

1. Investment needs and financing structures for data-sharing initiatives.
2. Legal and technical barriers to data sharing.
3. Governance models for data spaces and intermediaries.
4. Incentives and risks for private investors.
5. Public-private partnership opportunities and lessons from other sectors.

Interviews were recorded (with consent), transcribed, and analysed thematically to identify convergence and divergence in stakeholder perspectives. The findings were considered together with 4Growth deliverables and EU strategy documents.

Interview Participants and Key Insights

Participant 1– Pubic Officer, EU

- Highlighted the strategic need for neutral, trusted data intermediaries.
- Emphasised legal certainty around data sharing and the role of public entities in facilitating trust.
- Advocated for learning from other sectors (e.g., mobility) where data-sharing mandates triggered innovation.

Participant 2– Private Investor

- Described incompatibilities between venture capital timelines and agri-data business models.
- Recommended hybrid instruments like innovation loans and fiscal incentives (e.g., SEIS[8]).
- Criticised overreliance on crowdfunding and stressed the need for public de-risking.

Participant 3– Independent Consultant

- Called for investment in use cases rather than just infrastructure.
- Pointed to semantic fragmentation as a key barrier to cross-border data reuse.

[8] See footnote 2 above.

- Proposed phased funding strategies with 5-year public support windows.

Participant 4– Private Investor & Innovation Ecosystem Expert

- Categorised investment types (e.g., VC, bond, public) by their logic and sector fit.
- Emphasised the need for interoperability and capacity-building.
- Warned of lock-in effects without strong regulation and open standards.

These interviews offered nuanced perspectives on how public policy can stimulate digitalisation while balancing market dynamics and public value. They played a foundational role in shaping the policy recommendations presented in this brief.

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Full Title	**4Growth** - Digital Agriculture and Forestry: Understanding the Market to Forecast and Support Future Growth			
Project number	101134855		**Acronym**	4Growth
Start date	01.01.2024		**Duration**	36 months
Granting authority	European Research Executive Agency (REA)			
Project Coordinator	STICHTING WAGENINGEN RESEARCH (WR)			
Date of delivery	Contractual	M18	**Actual**	M18
Type	R - Document, report		**Dissemination level**	SEN - Sensitive
Lead beneficiary	[Name of the organisation]			
Lead author	Can Atik (WR)		Email	Can.atik@wur.nl
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Reviewer(s)	Adelė Janulionytė (AFL), Eckhard Störmer (FI)			
Keywords	Digitalisation of Agriculture and Forestry, Data Sharing, Intertoperability, Investment Incentives, Business Models, Entrepreneurship, Best Practices			

Document Revision History				
Version	**Issue date**	**Stage**	**Changes**	**Contributor**
0.1		Draft	First Outline	WR
0.2	23.05.2025	Draft	First Draft for internal review	WR
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Executive Summary

The adoption of data and digital technologies (D&DT) in agriculture and forestry offers immense potential to boost sustainability, productivity, and market transparency. However, private investment in this domain remains limited, fragmented, and risk-averse. While public programs have seeded innovation ecosystems, the next stage of growth requires a structural shift toward blended and strategic private capital.

This policy brief focuses on unlocking private investment and innovation capacity in agri-digital ecosystems & the best practices for value chain actors. In this regard, the brief complements Policy Brief A, which focuses on policy recommendations, by focusing on the innovation and investment logic of the private sector and offering pathways for coordinated action for value chain actors. Drawing on insights from the 4Growth project, other EU initiatives (including AgriDataSpace, QuantiFarm, FoodScaleHub, and MEF4CAP), alongside stakeholder interviews with private investors, data intermediary managers, and policymakers; this brief outlines actionable steps to overcome investment bottlenecks and enable innovation at scale.

To address the investment barriers, the brief presents a series of targeted best practices for value chain actors including, but not limited with below points;

- Develop scalable, user-centric business models such as freemium or tiered pricing structures that support gradual adoption and tangible farmer value.
- Supporting regional investment ecosystems through public-private partnerships.
- Partner with cooperatives and producer groups to reduce risk, pool demand, and improve access to training, financing, and shared infrastructure.
- Co-develop solutions with local users and contribute to open-source platforms, ensuring relevance across diverse agro-climatic and regulatory contexts.
- Pilot new technologies in controlled settings, using feedback loops and shared performance dashboards to validate return on investment.
- Funding investor readiness and small to medium-sized enterprise (SME) support programs, especially in underserved subsectors.
- Invest in and adopt modular, interoperable digital tools that integrate with existing systems and minimise lock-in risk.

This shift, among others listed below in the main text, will empower private actors to co-drive digital transformation in ways that are financially viable, socially inclusive, and technologically open.

Target audiences for this brief include private and institutional investors, venture capital funds, digital innovators, SME networks, and public authorities managing InvestEU, Common Agricultural Policy (CAP), and digital innovation funds.

1. Introduction

Unlocking the potential of digital and data technologies in agriculture and forestry is not only a policy ambition, but it is also a practical challenge facing thousands of value chain actors across Europe. While digital tools such as remote sensing, precision agriculture, and blockchain traceability offer tangible benefits (from input efficiency to market transparency), their adoption remains uneven, especially among small and medium-sized actors.

This policy brief is aimed directly at these actors. It sets out the best practices, success factors, and replicability conditions for the effective uptake of digital tools in real-world agricultural and forestry contexts. Rather than prescribing one-size-fits-all solutions, it offers guidance grounded in sectoral insights. The focus is on actionable lessons for practitioners, innovators, and cooperatives navigating the digital transformation.

The brief draws on findings from the 4Growth project, as well as lessons learned from aligned EU projects (AgriDataSpace, QuantiFarm, FoodScaleHub). It is further informed by targeted stakeholder interviews with technology investors, digital platform operators, and European Commission officials, capturing first-hand accounts of opportunities and constraints in digital innovation ecosystems.

Across these sources, a clear message emerges: value chain actors are not merely end-users of digital tools, but also are essential participants in shaping data-sharing ecosystems and building trust in innovation. Whether co-developing decision support tools, testing interoperability standards, or engaging in pilot observatories, their experience determines what succeeds, what fails, and what scales. This brief aims to support their decisions with practical insights, sectoral lessons, and cross-border learning to foster inclusive and future-ready digital transformation. Despite the main focus being on private actors, it also touches upon the role of public bodies in the realisation of best practices by private actors. In this regard, it complements Policy Brief A above by focusing on the ecosystem logic, financing structures, and enabling conditions needed to attract private capital and scale innovation responsibly.

2. Challenges for Private Uptake: Structural and Market Barriers to Digital Adoption

Despite growing potential for digitalisation across agriculture and forestry, private value chain actors, particularly SMEs, cooperatives, and independent farmers and forestry operators, continue to face substantial barriers in adopting digital and data technologies. These challenges are not merely technical but are embedded in socio-economic structures, sector fragmentation, and misaligned incentives.

One of the most significant obstacles is data asymmetry and access control. Large corporations often treat data as a source of strategic advantage, maintaining closed "data lakes"[9] and resisting open sharing frameworks. This creates a structural imbalance in which smaller actors are excluded from key datasets needed for Artificial Intelligence (AI) tools, predictive analytics, or market intelligence. In such an environment, start-ups and small tech providers struggle to build sustainable business models, despite offering promising services.

[9] This notion is used by one of the interviewees, emphasising that some data sets are large, but disconnected from the other data systems.

The agricultural innovation cycle is longer and more uncertain than in other typical digital markets. For example, crops are harvested once a year and yields are affected by several uncertain factors such as climate and weather changes or biological variation in growth processes. Hence, regular venture capital (VC) models are sometimes not fully suited to agri-digital investments, which require 'patient capital'[10] (longer payback times), infrastructure coordination, and bundling with non-digital services. Without tangible, near-term value for farmers and SMEs, adoption remains slow, especially in segments with low margins or complex stakeholder dynamics, such as in agriculture and forestry.

Additional challenges include:

- **Lack of Incentives:** Incentives for the value chain actors are an important issue. There is no clear incentive for data holders to share data with others. Sharing data with direct rivals, potential competitors, impartial actors, and non-profit organisations creates different (conflicts of) interest settings.
- **Limited internal capacity**: Many SMEs and cooperatives lack in-house information technology (IT) expertise to evaluate or deploy digital systems. Low digital maturity and user acceptance are also critical barriers. Many farmers and forest operators lack the digital literacy or capacity to adopt advanced tools. This affects customer acquisition, increases service costs, and reduces investor confidence in go-to-market strategies.
- **Bilateral lock-in models**: Market practices still favour closed, one-to-one data-sharing agreements, especially between large firms and suppliers. This discourages open innovation and prevents small actors from achieving data scale, limiting the attractiveness of ecosystem-wide platforms.
- **Platform trust deficit**: Without transparency in governance or clear benefit-sharing mechanisms, actors hesitate to engage.
- **Legal unclarity**: The confusion about data ownership, fear of legal liability, non-compliance, or unpredictable enforcement creates a "regulatory risk premium" for private actors. This particularly affects firms considering cross-border expansion or integration into federated platforms like the Common European Agricultural Data Space (CEADS).
- **Semantic fragmentation**: Diverse ontologies and data models prevent seamless tool integration across regions.

These barriers do not operate in isolation; they compound one another. Fragmented ecosystems make interoperability more costly. Lack of shared standards increases vendor lock-in. And low trust reinforces monopolistic behaviours. Understanding these layered dynamics is essential for designing enabling environments. 4Growth's analysis confirms that these uncertainties reduce investor confidence, particularly for infrastructure or platform-based solutions that rely on broad user participation and long-term legal stability.

[10] In the sentence, patient capital refers to long-term investment where the investor is willing to wait a considerable amount of time (longer payback times) before seeing a financial return.

3. Best Practices for the Value Chain

This section provides best practices for value chain actors, including farmers, cooperatives, food processors, and forest managers, seeking to adopt data and digital technologies effectively. Drawing on findings, the practices are organised across five domains: data governance, technical implementation, business and financing models, capacity-building, and regional adaptability. These categories reflect common barriers and enabling factors identified through project deliverables and stakeholder interviews. By following these guidelines, value chain actors can navigate the digital transition in ways that are secure, scalable, and context-sensitive.

3.1. Data Governance and Trust

Digital adoption depends on trust. Farmers and cooperatives are more likely to engage with digital tools when platforms are governed transparently, benefits are clearly defined, and data control remains in users' hands.

Several cooperative models demonstrate how value chain actors serve trusted intermediaries in digital ecosystems. By pooling data across members, the co-op improves market access and reduces certification costs. Success hinges on governance transparency, shared incentives, and opt-in participation.

In this regard, the following is important:

- **Engage in neutral, trusted data-sharing ecosystems**: Join platforms with transparent governance models to ensure equitable data access and avoid monopolistic control.
- **Look across sectors for proven models**: Apply lessons from mobility, energy, and health data-sharing schemes that have succeeded through regulation and stakeholder alignment.
- **Apply horizontal tools**: Understand the sectoral implications of the Data Act, Data Governance Act, and related regulations, and apply the data access and sharing rights to unlock ag-data.
- **Develop and follow sector-specific codes**: Develop sectoral principles and create mechanisms for broad participation and enforcement.

3.2. Technical Implementation and Interoperability

Successful deployment of digital technologies in agriculture and forestry requires solutions that are both fit-for-purpose and interoperable. Semantic standards are important. Adopting tools that comply with open ontologies and vocabularies to ensure future interoperability is strongly proposed as best practice. Across use cases (from precision irrigation and remote sensing to forest carbon monitoring), the most widely adopted tools shared three traits: modularity, usability, and integration capacity. A key enabling condition is semantic interoperability, i.e. ensuring that data from diverse systems speaks the same language.

In this regard, the following recommendations are important;

- **Use cloud-native, modular tools compatible with existing systems:** Select digital solutions that are designed to integrate seamlessly with current farm machinery, software, and data workflows to maximise usability and minimise disruption.
- **Prioritise technologies that embed interoperability standards:** Adopt tools that comply with recognised ontologies and data protocols to ensure compatibility across platforms and long-term scalability.
- **Ensure tools function in low-connectivity environments:** Choose applications that offer offline modes or local data caching to maintain reliability in areas with limited internet access.
- **Prioritise usability over technical complexity**: Focus on tools that provide immediate, measurable benefits, such as cost savings, risk reduction, or time efficiency.
- **Avoid vendor lock-in through open Application Programming Interfaces (APIs) and modular design**: Choose tools that can be connected, upgraded, or replaced without losing functionality.
- **Test tools through time-limited pilots**: Run controlled trials before scaling to reduce user risk and gather performance data.
- **Join pilot ecosystems and demonstration projects**: Participate in co-funded pilots to learn about tool functionality and receive technical support during early adoption.

3.3. Business Models and Investment Readiness

Several promising digital technologies never reach full uptake due to unsustainable business models or unclear value propositions. For example, some initiatives failed due to a lack of scalable partnerships and exclusive data access demands from larger players. Other startups struggled when large actors offered similar services at marginal costs. Conversely, technologies with modular pricing (e.g., freemium models), local partnerships, and clear return on investment (ROI) metrics showed higher uptake. Farmers were more willing to adopt when they could try tools at low cost, observe benefits, and scale later.

The following points are important in this regard:

- **Ensure technologies deliver clear economic returns**: Focus on solutions that generate measurable value, such as cost savings, productivity gains, or compliance facilitation, to build user trust and justify investment.
- **Avoid dependency on exclusive data arrangements**: Design services that do not rely on access to proprietary data controlled by larger actors, which can limit scalability and create lock-in.
- **Adopt modular or freemium pricing models**[11]: Allow users to try basic services before committing financially, lowering adoption barriers and generating usage feedback.
- **Use tiered pricing models to lower adoption barriers**: Design pricing structures that accommodate the financial constraints of smallholders, allowing gradual onboarding and scaling of digital services.

[11] A freemium pricing model provides users with free access to a basic version of a product or service, while offering additional features or enhanced functionality through a paid upgrade.

- **Design for scalability from the start**: Build tools that can serve diverse users or geographies and demonstrate growth potential to attract financing.
- **Partner with cooperatives and producer groups to pool risk**: Collaborate with collective organisations to reduce individual investment risk, accelerate peer learning, and increase tool uptake across communities.
- **Introduce or leverage available fiscal incentives**: Explore national programs that offer tax credits, depreciation schemes, or early-stage innovation support to improve financial viability.
- **Look across sectors for proven models**: Before contributing data, value chain actors should ensure that they receive clear, tangible benefits such as analytics, benchmarking, or compliance support.
- **Embed services in resilient funding ecosystems**: Ensure long-term sustainability by aligning digital solutions with diversified financing models, including growth capital, repayable grants, and government-backed public-private partnerships.

3.4. Skills and Capacity-Building

Digital tools fail when users cannot make sense of them. From precision seeding tools to remote-sensing platforms, limited digital literacy among farmers and forest managers remains a key constraint. In forestry, for example, the adoption of systems is hindered by the need for specialised interpretation skills, particularly in remote areas with limited technical support. Similarly, many agricultural decision support system tools require users to manually input geospatial and biological data, a task made difficult by data quality and skill gaps.

In this regard, the following points are important;

- **Bundle digital tools with training and advisory support**: Offer tools alongside coaching, either through cooperatives, suppliers, or advisory services.
- **Embed "data steward" roles within cooperatives or SMEs**: Assign individuals to assist peers with data management, platform use, and benefit-sharing arrangements.
- **Leverage peer networks for shared learning**: Encourage cooperatives and producer groups to host internal training sessions and demo days.
- **Cooperate across actors to reduce adoption costs**: Share infrastructure, licenses, and advisory services to improve economies of scale and collective learning.
- **Build training modules tailored to technology type and user profile:** Design educational content that addresses the specific skills needed for decision support systems, variable rate technologies, robotics, and other tools, while adapting to users' digital literacy levels.
- **Combine classroom learning with field-based demonstrations:** Use blended training approaches that mix formal instruction with hands-on onboarding and real-world tool application to reinforce learning and confidence.
- **Deploy advisors to support governance and use:** Assign trained intermediaries to help farmers navigate data collection, consent, sharing, and analysis, ensuring responsible and effective use of digital technologies.

3.5. Replicability and Regional Adaptability

Technologies that succeed in one context often fail to be effective in another context due to differing infrastructures, regulatory frameworks, or socio-cultural dynamics. For instance, while management information systems (FMIS) adoption rates reach a high percentage in Flanders, uptake is far lower in Southern and Eastern Europe due to broadband gaps and lower digital readiness. Forestry decision support system tools are widely used in countries with robust forest inventory systems, but have limited utility in smallholder or community-managed forests.

In this regard, the following points are important;

- **Co-develop technologies with local users and contexts**: Involve farmers, foresters, and cooperatives in the design process to ensure tools align with regional production systems, workflows, and data environments.
- **Pilot tools across diverse agro-climatic zones before scaling**: Test digital solutions in varied ecological and farming contexts to assess adaptability, performance, and broader applicability.
- **Embed localisation features to enhance relevance and usability**: Include multilingual interfaces, region-specific datasets, and compliance with local regulations to increase uptake and user trust.
- **Align digital strategies with preferred future scenarios**: Promote federated infrastructure and open data commons, and avoid the platform consolidation risks.

Taken together, these best practices form a dynamic toolbox for value chain actors. They are neither exhaustive nor universally prescriptive, but when adapted to context, tested iteratively, and supported by ecosystem actors, they can accelerate digital transformation that is inclusive, efficient, and resilient.

4. Strategic Recommendations

This section provides a set of actionable strategic recommendations for value chain actors, including farmers, foresters, cooperatives, food processors, agri-tech innovators, investors, and technology developers, who are navigating the digital transition. The recommendations are structured around five interconnected areas critical to the successful adoption and scaling of digital technologies: user-centric design and deployment, business model innovation, data governance, skills development, and ecosystem collaboration. Each sub-section offers practical guidance tailored to real-world conditions and highlights key enablers for resilient and inclusive digital transformation.

4.1. Design and Deployment of Farmer-Centric Digital Tools

Digital tools must be designed with the needs and constraints of end-users in mind. This section outlines practical strategies to ensure digital solutions are usable, context-aware, and interoperable from the outset.

- **Develop usable and value-driven tools for end-users:** Prioritise user-centric design, especially for small-scale farmers. Build clear service-based revenue models rather than speculative data monetisation.

- **Develop modular, scalable, and interoperable digital tools:** Solutions should support both entry-level and advanced users. Flexibility is key. Farmers must be able to adapt tools to their

operational scale and digital literacy. Co-pilot metaphors (rather than automation) resonate better with farmers and foresters.

- **Incorporate usability testing with diverse archetypes:** Tool developers should engage value chain actors throughout the design process to ensure accessibility for reluctant adopters and smallholders.

4.2. Investment and Business Model Innovation

Unlocking the full value of digital agriculture requires more than technology. It demands innovative financing and viable business models. The following recommendations focus on how value chain actors can improve investment readiness and align incentives for sustainable deployment.

- **Adopt hybrid investment strategies combining public seed funding and private scale-up capital:** Especially relevant for SMEs and innovators with moderate growth potential. Bond instruments, innovation loans, and equity-debt mixes can mitigate risk.
- **Design clear, ROI-oriented value propositions:** Tools must articulate how they deliver efficiency, traceability, or compliance benefits to their users. Benchmarks and real-time monitoring can inform these metrics.
- **Ensure financial models are adapted to fragmented, low-margin sectors:** Value chain actors should avoid over-relying on high-margin assumptions or investor models from other sectors (e.g. automotive or healthcare). Instead, tailor strategies to the realities of agriculture and forestry.
- **Co-develop investment models tailored to sector realities:** Adopt longer-term investment horizons and explore debt instruments or bonds for infrastructure financing. Use venture capital strategically for high-potential digital service layers.
- **Adopt innovative and diversified digital business models:** Develop flexible service models tailored to the needs of small and mid-sized farms to ensure economic viability and broad market inclusion.
- **Improve transparency and traceability through digitalisation:** Leverage digital tools to enhance supply chain visibility, enabling better risk management, quality assurance, and consumer trust.
- **Ensure fairness in digital collaboration models:** Design business arrangements that are equitable and appealing to all partners, preventing dependency on dominant actors and fostering balanced value distribution.
- **Utilise advanced data management systems to guide decisions:** Implement analytics platforms and integrated dashboards to support evidence-based planning and production optimisation.
- **Pilot tools through structured, low-risk trials:** Before full adoption, test new digital tools in collaboration with cooperatives, advisors, or public innovation platforms. Pilots help gather user feedback, demonstrate value, and reduce investor uncertainty.
- **Engage with hybrid financing models:** Combine early-stage public support with later-stage private investment. Innovation loans, repayable grants, and blended finance instruments are particularly suited for data-intensive ventures with long return horizons.

- **Tailor investment strategies to investor types:** Infrastructure projects may attract bond financing or long-horizon capital, while service-layer tools with fast growth potential may suit venture capital. Matching the funding model to the asset profile is key.
- **Leverage fiscal incentives and depreciation schemes:** Explore national tools such as the Dutch BV depreciation model or UK-style SEIS[12] programs to attract early-stage investors and improve post-tax ROI.
- **Design scalable and modular offerings:** Tools or platforms should be adaptable across contexts and sectors. Modularity helps reach critical mass and reduces investor perception of vendor lock-in or over-customisation risks.
- **Avoid over-reliance on exclusive data sources:** Build business models that do not depend on privileged access to data held by dominant actors. Instead, seek interoperability and openness to attract a broader user base and mitigate lock-out risks.
- **Aggregate users and demand signals through cooperatives or ecosystems:** Cooperatives and producer networks can pool demand, reduce onboarding costs, and offer investors more reliable customer acquisition routes.

4.3. Data Governance and Interoperability

Effective digitalisation depends on functional data exchange. This section presents approaches for improving data governance practices and adopting interoperability standards that enable cooperation and reduce lock-in risks.

- **Establish transparent data handling and benefit-sharing mechanisms:** Smallholders and cooperatives need clear rules on what data is collected, how it is used, and what returns they can expect. This is vital for reducing fears of exclusion or exploitation
- **Prevent vendor lock-in by adhering to open standards and interoperability:** Ensuring portability of data and tools helps farmers avoid dependency on single providers. Embed interoperability standards from the outset: Tools must comply with open standards to ensure semantic and legal compatibility with broader ecosystems like CEADS.
- **Support open innovation and avoid exclusive data practices:** Ensure platform and service interoperability. Avoid closed data monopolies that limit scalability and exclude new entrants.

[12] The Seed Enterprise Investment Scheme (SEIS) in the UK incentivizes investment in early-stage companies by providing generous tax benefits to investors. Under this scheme, eligible startups can raise up to £250,000 in equity financing, while investors benefit from substantial income tax relief and exemptions from capital gains tax on any resulting profits. See more at https://www.british-business-bank.co.uk/business-guidance/guidance-articles/finance/what-is-the-seed-enterprise-investment-scheme-seis#

4.4. Skills and Capacity Development

Digital transformation is not only technical, it is social and educational. The recommendations below address the skills, advisory structures, and learning formats needed to enable confident, informed use of digital tools across the value chain.

- **Invest in digital literacy and upskilling within organisations:** This includes technical training, data interpretation, and understanding compliance obligations. Practical storytelling and case-based learning work well for reluctant users.
- **Create internal roles or partnerships for data stewardship:** Actors can designate staff or advisors responsible for managing data flows, ensuring compliance, and supporting uptake, especially relevant for cooperatives and processors handling farmer data.

4.5. Ecosystem Engagement and Co-Creation

Digital innovation does not happen in isolation. This final sub-section emphasises the importance of collaboration, open infrastructure, and multi-actor co-investment to scale solutions that deliver both private value and public benefit.

- **Engage in observatories and pilot projects:** Participating in regional testbeds, 4Growth observatories, or Sustainable Innovation Pilots enhances visibility, provides feedback loops, and helps shape sector-wide standards.
- **Contribute to open-source and shared tool development:** Especially in areas like traceability, MRV (measurement, reporting, verification), and smallholder-friendly digital services.
- **Use performance-based validation tools to de-risk innovation:** Fund digital solution pilots and use regional dashboards to assess real-world performance. Tie financing eligibility to proven cost-benefit metrics.
- **Coordinate with public actors on dual-use infrastructure:** Jointly invest in cloud services, AI platforms, or traceability layers that support both public compliance functions and private innovation.
- **Develop formal Public-private partnerships (PPPs) for data infrastructure and services:** Establish governance models that combine public oversight with private innovation. Ensure neutral data intermediaries and equitable platform participation.

5. Conclusions

Digital transformation in agriculture and forestry will not be achieved by policy alone. It will depend on the everyday decisions of farmers, cooperatives, forest managers, food processors, and agri-tech entrepreneurs, those value chain actors who translate technology into practice.

This policy brief has shown that private actors face persistent barriers: fragmented markets, opaque data governance, vendor lock-in risks, and uncertain returns on digital investment. But it has also identified enabling conditions: modular tools, trusted intermediaries, targeted capacity-building, and blended financing that can unlock scalable and inclusive innovation.

The strategic recommendations and best practices outlined in this brief aim to empower private actors not only as users of technology but as co-designers of digital ecosystems. Whether by engaging in pilot

platforms, adopting interoperable standards, building internal data stewardship capacity, or working through cooperatives to negotiate fairer terms, value chain actors have agency in shaping the digital future.

Immediate next steps for private actors include:

- Piloting new tools with trusted partners and advisory support;
- Joining shared data platforms with transparent governance;
- Co-investing in open-source solutions and modular infrastructure;
- Strengthening internal capacity through training or partnerships;
- Advocating for semantic standards, fair data sharing rules, and funding access.

Specific tips for private actors include:

- Engage with hybrid financing models that combine public seed funding with private capital, using instruments such as innovation loans, repayable grants, or blended funds to de-risk scaling.
- Tailor investment strategies to investor types, aligning project profiles with appropriate funding structures such as bonds for infrastructure or VC for high-growth service tools.
- Leverage fiscal incentives and depreciation schemes in national contexts (e.g., SEIS-style[13] programs or tax depreciation tools) to enhance investment attractiveness.
- Design scalable and modular offerings that can serve a broad user base across geographies and sectors, improving both investor appeal and user adaptability.
- Avoid exclusive data dependencies, and instead prioritise open access, interoperability, and transparent governance models.
- Aggregate user demand through cooperatives or networks to enhance purchasing power, reduce adoption costs, and improve investor confidence.
- Treat capacity building as a strategic investment, embedding digital literacy, data management, and innovation support within organisations.
- Adopt open standards and avoid lock-in, ensuring that platforms remain portable and adaptable as needs evolve.
- Be cautious with crowdfunding unless supported by strong financial literacy and risk management practices.

This brief complements Policy Brief A by shifting the lens from what public authorities must do to what private actors can do, and must be supported to do, to scale innovation. The road ahead requires coordinated action. With the right tools, partnerships, and frameworks in place, value chain actors can lead Europe toward a more resilient, data-driven agricultural and forestry economy.

[13] See footnote 4 above.

ANNEX: Stakeholder Interview Summary & Methodology

As part of the 4Growth project, semi-structured interviews were conducted between March and April 2025 with key stakeholders involved in agricultural digitalisation. The aim was to better understand the conditions under which private investment can be attracted, sustained, and aligned with public sector goals. Interviews were analysed thematically to extract insights on investment barriers, financing models, legal risks, and innovation pathways.

Interview Participants and Key Insights

Participant 1– Pubic Officer, EU)

- Emphasised the importance of neutrality in data intermediaries.
- Highlighted legal uncertainties and lack of trust as key inhibitors to private investment.
- Suggested that sustainable business models must avoid monetising data directly.
- Stressed the need for regulatory clarity and public seed funding.

Participant 2– Private Investor

- Stated that current VC models are poorly suited to agri-digital innovation due to slow growth and high dependency on large players.
- Recommended alternative financial instruments such as innovation loans and growth capital.
- Advocated for fiscal incentives similar to the UK's SEIS[14] scheme.
- Cautioned against over-reliance on crowdfunding due to investor inexperience.

Participant 3– Independent Consultant

- Proposed a two-phase funding strategy: 5 years of public support followed by the gradual introduction of private capital.
- Emphasised that infrastructure is mature; focus must shift to use-case investment.
- Recommended that business models rely on service value rather than proprietary data control.
- Highlighted semantic interoperability as a priority investment area.

Participant 4– Private Investor & Innovation Ecosystem Expert

- Mapped four investor profiles: venture capital (high risk, short-term), private equity (medium-term), bond investors (low-risk, long-term), and public actors (impact-driven).
- Called for regional PPP investment platforms embedded in CEADS nodes.
- Advocated for open standards, skill development, and tailored incentives.
- Warned that short-term investor logic is misaligned with the infrastructure-heavy nature of agri-digital systems.

[14] See footnote 4 above.