Innovation in digital and data technologies in (precision) agriculture – An EU level perspective

CropLife Annual Conference

7 March 2023

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Ambitions and challenges as drivers

- → **Sustainability**
- → **Competitiveness**
- → **Performance orientations**
- → **Simplification**
- → **Reduction of administrative burdens**
- → **Capitalisation of data**
- → **Changing legal framing conditions**

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Many innovative solutions exist …

- Emission reduction potential of digital technologies revealed
- Increased weight of software and data-based solutions in AgTech
- Data quantity and quality determinants of effectiveness
- Innovative B2B, B2G and G2B data-sharing solutions explored
- Numerous use cases exist; not all achieve market maturity

Digital innovation for sustainable agriculture – more than smart tech

Innovation in precision farming: key tools to achieve environmental and socio-economic sustainability ambitions and increase competitiveness; digitalisation is not an “end in itself”.

Digital and data-based solutions offer more for sustainable & resilient farming systems including through innovation in support of

- Specific production approaches, e.g. in agro-ecology, organic, intercropping
- (Integrated) Pest management (IPM)
- Approaches to strengthen circular bioeconomy

Example - Plant pest early detection at large scale

Detecting and monitoring Xylella fastidiosa (Xf, bacterial pathogen) at large scale with Sentinel-2 data, thermal- and hyperspectral data to discriminate from water stress and other diseases (inducing similar set of symptoms) at orchard level (Hornero et al., 2020, Poblete et al., 2021)

XF ACTORS
Xylella Fastidiosa Active Containment Through a multidisciplinary-Oriented Research Strategy

xfactorsproject.eu

R&I agenda – focal points and principles

- Assessing the **uptake and performance** of digital technologies in agriculture
- Addressing **specific needs** in the development of digital applications and infrastructure; closing **market gaps**
- Strengthening capacities for the **effective and efficient (re)use of data** in the public and private domain
- Achieving **synergies between private and public sector** needs and capacities
- Following an **innovation system and a data system approach** as well as multi-actor- and end-user-centric approach
- Considering **legal framing conditions, business models**, and **demonstration effects**
- **Shortening innovation cycle**/ period to market maturity/end-user readiness

Digital and data technologies as enablers for sustainability transition in agriculture and food systems

Selected calls from the Cluster 6 Work programme 2021/22

2021

- Research & innovation roadmap for **blockchain technologies in the agri-food sector**
- **Potential of drones** as multi-purpose vehicle – risks and added values
- **Assessing the impacts of digital technologies** in agriculture – cost, benefits and potential for sustainability gains
- **Data economy in the field of agriculture** – effects of data sharing and big data
- **Digitalisation as enabler for agro-ecological farming approaches**

2022

- Smart solutions for the **use of digital technologies for small- and medium-sized**, farms and farm structures
- **Upscaling (real-time) sensor data for EU-wide monitoring of production and agri-environmental conditions**

Many topics have to consider changing legal framing conditions, including in the field of digital and data technologies

Digital and data technologies as enablers for sustainability transition in agriculture and food systems

Selected calls from the Cluster 6 Work programme 2023/ 24

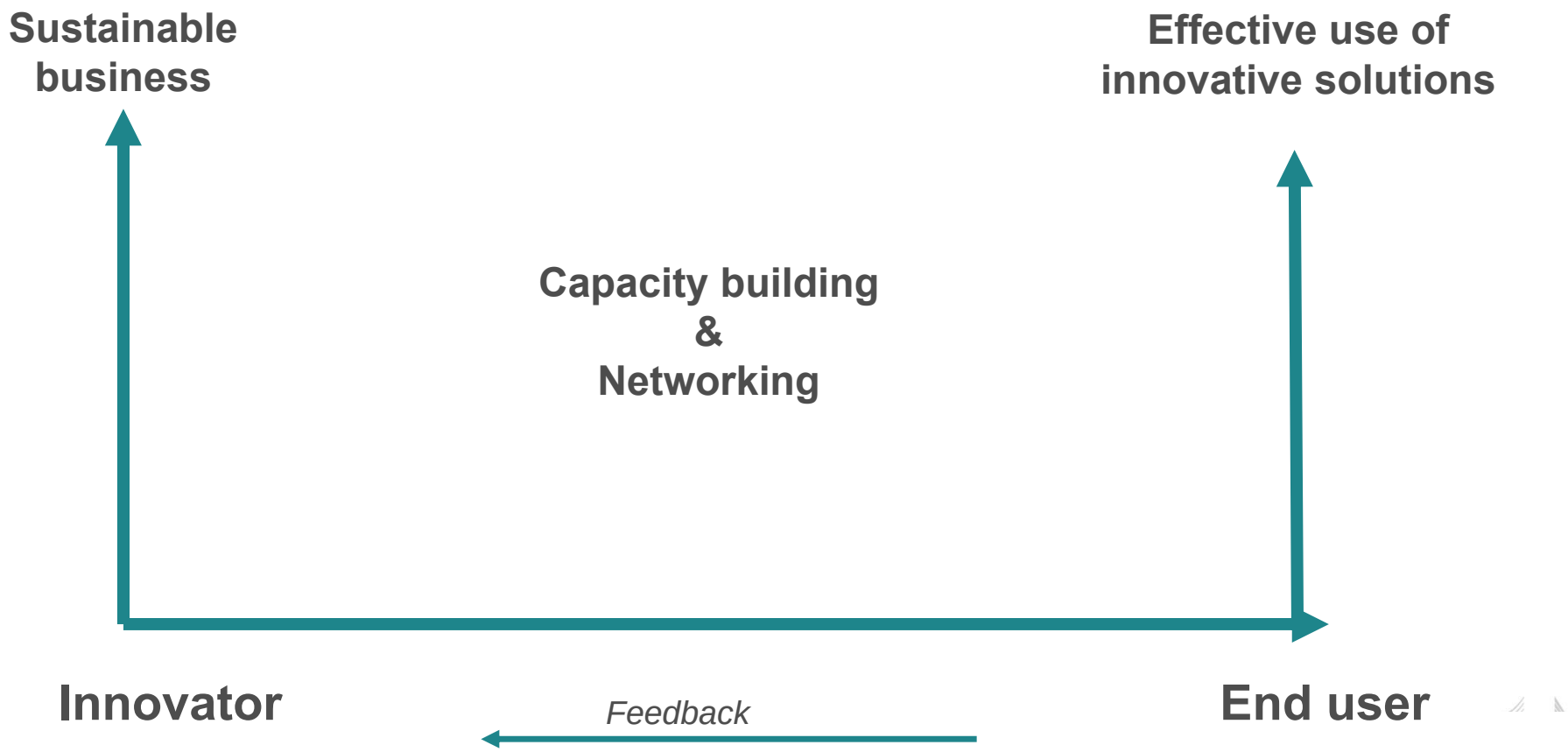
(some calls are currently open)

- **Horizon Europe partnership Agriculture of Data**
- Digitalisation in agriculture and forestry: **markets for data, and digital technologies and infrastructure – state of play and foresight in a fast changing regulatory, trade and technical environment**
- **Open source solutions for edge, cloud and mixed model applications to strengthen production and administrative capacities in agriculture**
- **Digital technologies supporting plant health early detection**, territory surveillance and phytosanitary measures
- Horizon Europe partnership Agro-ecology and Living Labs

Many topics have to consider changing legal framing conditions, including in the field of digital and data technologies

Image reference: Ministry of Saxony, Germany

Furthering innovation and its effective uptake



Upscaling

- Upscaling innovative solutions to achieve market maturity

- Upscaling (data-based) solutions from regional to national and European-scale

Which added value would have EU-wide IACS data sets for start-ups, the wider industry and the administration?

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Horizon Europe candidate partnership “Agriculture of Data”

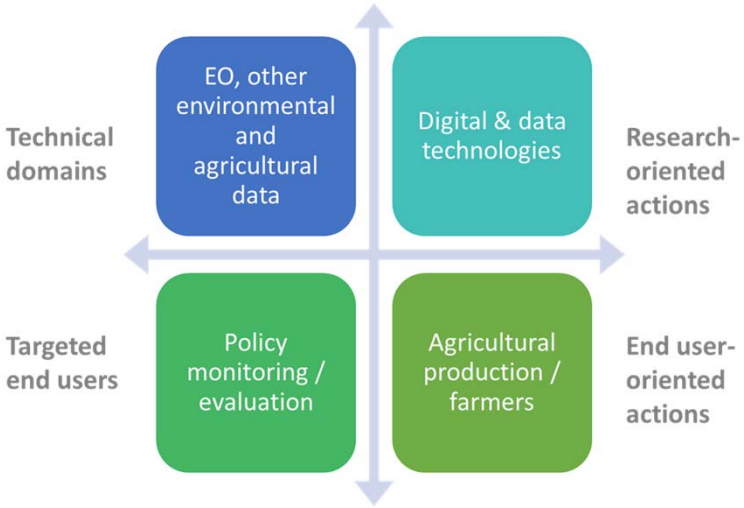
What?

Support to **sustainable agriculture** in Europe as well as **policy monitoring and implementation** by using the possibilities that **digital and data technologies** in combination with **environmental observation and other data** offer.

How?

- Development of **innovative data-based solutions and services** for the private and public domain them up (geographically and from innovation to deployment) through the capitalization of data

Domains covered:



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“Agriculture of Data” – Added value

Why a partnership?

- Increased demand for sustainability, adaptation to climate change, and performance orientation
- **Avoiding digital divides and closing of market gaps**
- Achieving an **"umbrella effect" and contribute to “defragmentation**” in the field of the development of data-based solutions for the agriculture sector and policy monitoring
- Achieving a **“critical mass” of the provision of reference data sets** needed for the effective application of “**Big data**” technologies, **as foundation for innovation**
- Covering several biogeographic zones to allow for the development of **climate adaptation approaches** for the sector
- **Covering whole Europe** to create data sets for policy monitoring and evaluation and avoiding “white spots” in the provision of independent data services to the sector and stakeholders

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“Agriculture of Data” – Partner composition and resources

- **Partners**: Member States and eligible Associated Countries, large geographical coverage
- **Countries** can be represented through ministries (e.g. ministries of agriculture, research & innovation and environment); (paying) agencies, universities, space agencies etc.
- **Private sector** actors will not be “main/ funding partners”; yet, involvement of private sector as intermediaries and end users essential for effectiveness of partnership, e.g. in advisory board; and business involvement through cascading (“innovation system approach”)
- **Resources**: EU contribution: € 100 million, total budget: around € 200 - 300 million
- **Life time**: 7-10 years (with the ambition to become sustainable)
- **Governance structures** will allow for “active steering”, direct involvement of actors along the innovation chain (not only end users), active policy-science interface, and synergies
- Using the potential of **B2G and G2B data sharing**

“Agriculture of Data” – Envisaged actions - Examples

What is in for … ?

- **All,** esp. **Innovators**: Reusable European-wide data-sets and services for further capitalisation
- **Farmers**: Enhanced independent decision-making support, climate adaptation strategies
- **Administration**: Strengthened monitoring and evaluation capacities, including for CAP implementation
- **Policy-makers**: Information for policy processes
- **Beneficiaries and administration**: Reduced administrative burden for administration
- **Data ecosystem**: Highlighted use potential for data spaces in terms of technological, governance and business solutions

\+ Capacity building for the use and re-use of data-based solutions

\+ Capacity building for implementing novel legislation in the field of data and digital technologies, e.g. Act for AI, Data Act

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Relevant actions under the Digital Europe Programme

- **Digital Innovation Hubs**
- **Testing and Experimentation Facilities for AI in agri-food**
  - Testing and performance assessment of AI-based applications to achieve market maturity
  - Network of trial sites
  - Capacity building
- Coordination and Support Action for the development of a **Common European Agriculture Data Space** following a participatory approach
  - Review of experiences with Code of conduct of agricultural data sharing by contractual agreement
  - Stocktaking of existing data spaces/ platforms
  - Development of business and governance model

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Complementarity of EU programmes: Examples in the fields of innovation in digitalisation

Policy instrument/ Programme	Scope	Examples	Comments
Horizon 2020/ Horizon Europe	**Research & Innovation**	Large-scale pilot projects with demonstration power Tailored themes, e.g. on digitalisation on small farms **Partnership Agriculture of Data**	Under Horizon Europe, especially Clusters 4 and 6 are relevant
Digital Europe Programme	**Innovation & Deployment** Capacity building	Digital Innovation Hubs Data spaces Testing and Experimentation Facilities for AI	Link to EIP-AGRI through network of Digital Innovation Hubs
Common Agricultural Policy	**Application** Capacity building for "end users" Innovation	Advisory services Training Investment support Agricultural Knowledge and Innovation System (AKIS) EIP-AGRI	Link to Horizon through EIP-AGRI

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Conclusions

- Digital and data technologies can contribute to the **enhanced sustainability performance** of agriculture; the quantification of the impact of digital technologies is challenging.
- R&I support strongly focuses on developing specific and **tailored data-based solutions** in agriculture.
- Data is a crucial determinant for the **effectiveness of digital technologies**.
- **Big data, European-wide data sets and systemic approaches** are essential for upscaling innovative solutions and enabling a diverse innovation ecosystem.
- **Public and private capacities and interests** are ideally seen together to increase effectiveness, use the potential of B2G and G2B data sharing, and reduce administrative burden.
- Private and public actors can shape the innovation and data ecosystems and create **favorable framing conditions** (including through networking, capacity building, the provision of data and legislation).
- **Policy instruments** to support “innovators” and “end users” at the different stages of the innovation cycle are available, and a flagship initiative fostering a comprehensive approach is developing – the **Horizon Europe candidate partnership Agriculture of Data**.

Thank you