Agriculture Data Space Event 6 September 2022

SAVE THE DATE

E DATE REGISTER NOW gaia-x



Session 2 Use Case part 1 & Discussion Panel, Data Space Today

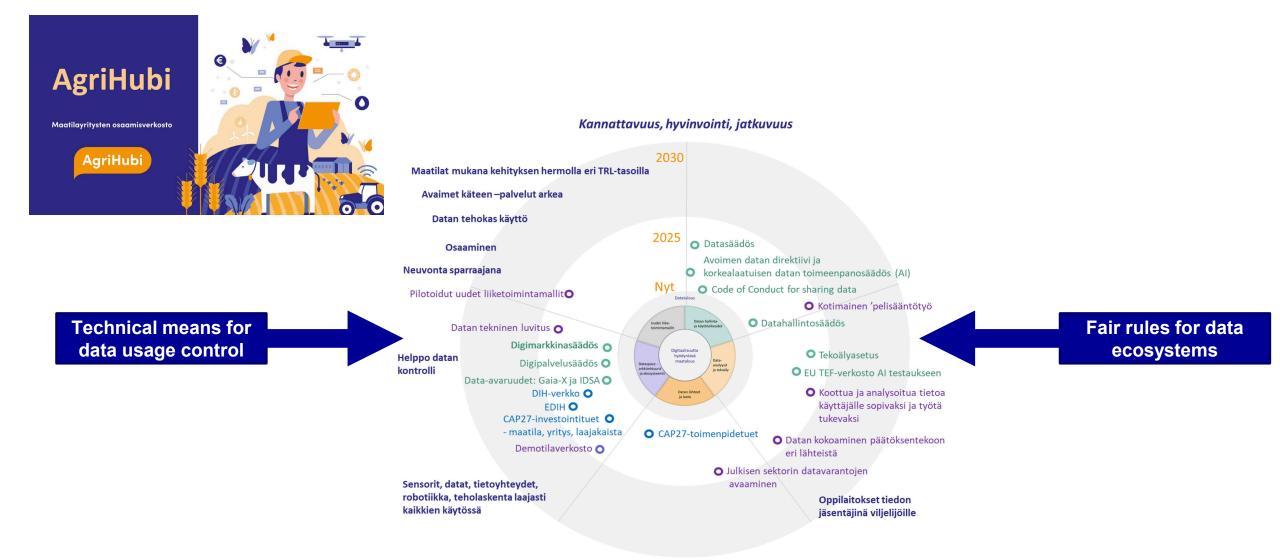
gaia-x

Fair data economy in agriculture

Marko Turpeinen – 1001 Lakes

Smart Farming 2030 Roadmap for Finland





Implementing Fair Data Economy in Agriculture



- Develop tools that promote the digitalisation of farms and agriculture towards a fair data economy.
- Project funded by the Finnish Ministry of Agriculture and Forestry.
- Create a fair data economy rulebook model for the agricultural sector, which will also be applied to the use cases addressed in the project.
- Co-development with stakeholders.

Data utilization

Farming processes

- Biological processes
- · Operational practices
- Markets and business environment
- Situational awareness, control, automation, autonomy, continuous improvement
- > Focus on effective primary use of data

Business processes and ecosystems

- Farm Tech provider
- Farm Farm
- Farm Producer
- Farm Consumer
- Joint value creation
- > Verifiability, traceability, transparency
- Collaboration and trust
- Focus on secondary uses of data

Data sources

- The quality of raw data by primary use
 Processing and manipulation of data for
- Processing and manipulation of data for secondary uses
- Metadata descriptions
- Effective use of FAIR principles (findable, accessible, interoperable, reusable)



- Data sovereignty
- Right to control the data use
- EU CoC for Data in Agriculture
- EU regulation (including Data Act)
- Data agreements
- Technical data usage control mechanisms

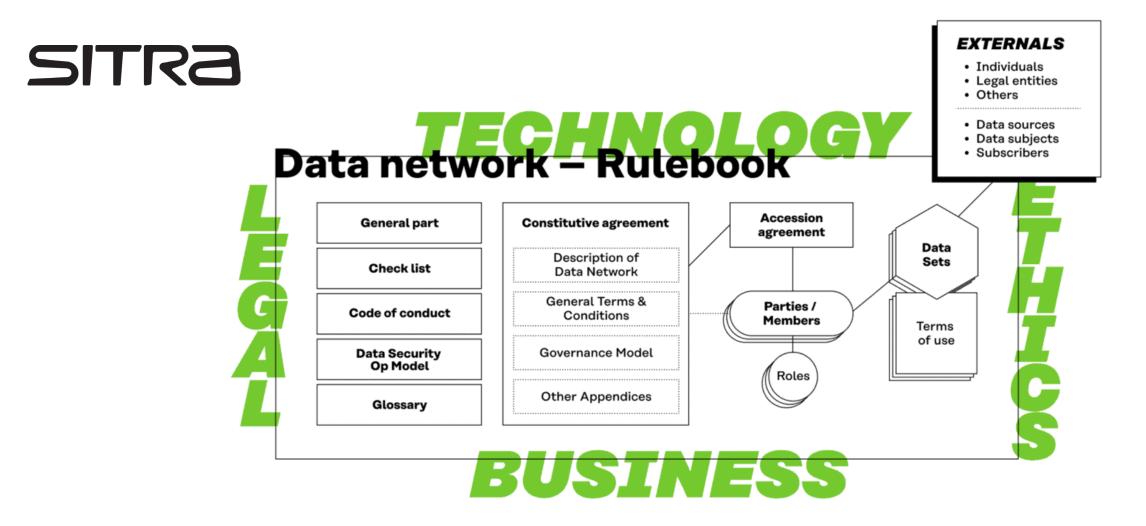






Fair Data Economy Rulebook





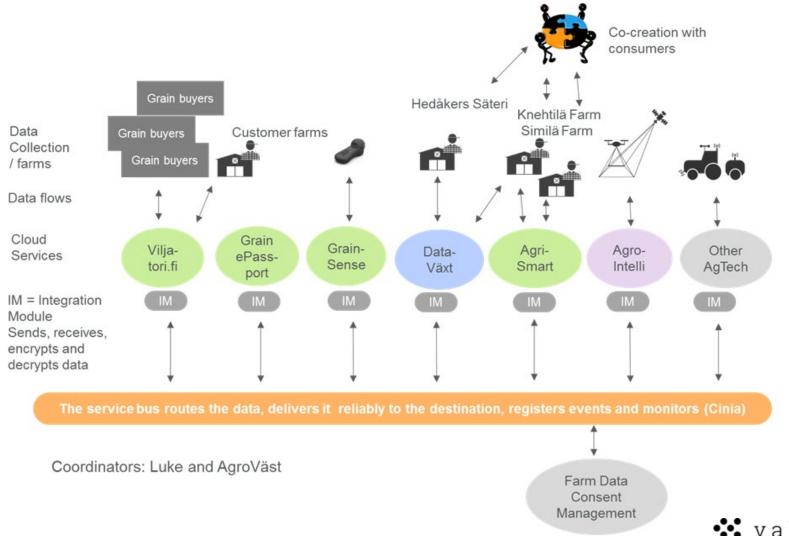
https://www.sitra.fi/en/publications/rulebook-for-a-fair-data-economy/

Valued Grain Chain

SMART Agri Hubs

Scandinavia



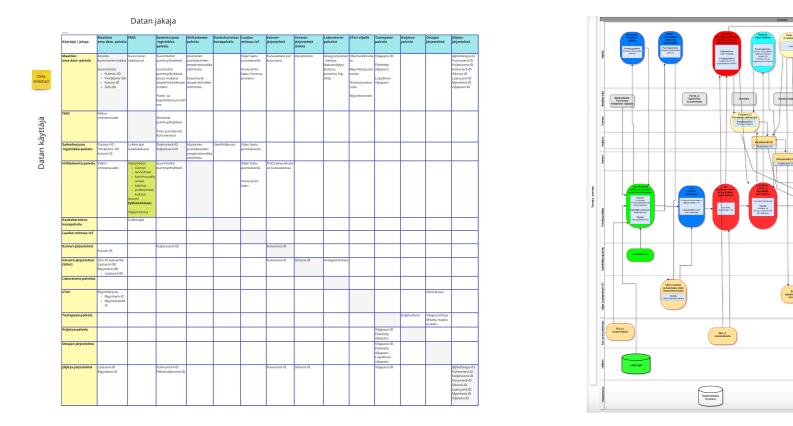


🔹 valued grain chain

Use Case: Farm planning and logistics



Data sharing matrix



Detailed map of data flows and data value

Lastariant D Antatin kyskopen silten Of Painust Painust ot Painust ot Painust ot Painust Painus Painust Painus Painust Painust Painust Painus Lastration 0 Antique historianes, alique Di Formanes (Di Portanes (Di Roberts) (Distance Roberts) Bissolario Bissolario Vige bascalario Vige bascalario Vige bascalario Vige bascalario

> Wjamarkkinan hiwlatiete

Lascalusen 10 Antilijer Kureaserien (e. Sritten Dr. Permanen St. Purtearen pastarten D. Statution I. beruarien Kureaserien D. Statution I. beruarien Vijen betrutet Vijen betrutet

- Strong focus on fair use of IoT data, and link to the forthcoming EU Data Act
- > Finalised rulebook (business, legal, technology, ethics) used as a basis for other agrifood business cases

AgriFood Data Space Finland



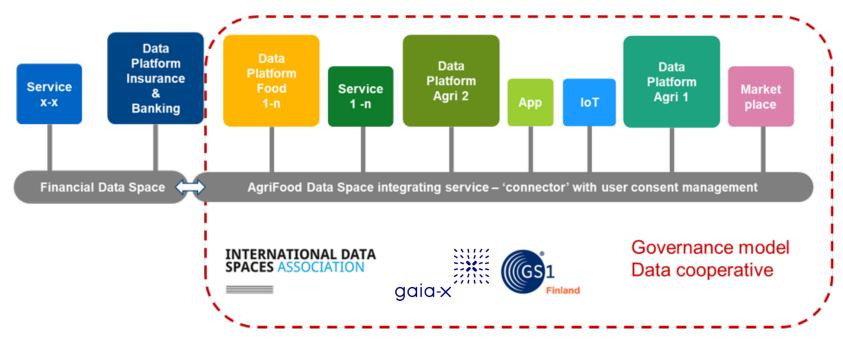
Finnish initiative covering broadly the AgriFood sector

- More than 50 committed participants
- Developed as Gaia-X compliant data infrastucture

AgriFood Data Space

Connecting platforms, services, data storages, apps, IoT systems and sensors to a data space where data connections are easy and cost-efficient to establish data flows – also for cross-sectoral data flows.







Thank you!

marko.turpeinen@1001lakes.com





Agri-Gaia

Prof. Dr. Stefan Stiene – University of Applied Sciences Osnabrück





- Agri-Gaia is a GAIA-X Use-Case in the German GAIA-X hub
- We build dataspace to exchange datasets, AI-models and AI-services in the agrifood domain.
- Goal: Ease the development and application of AI in the agrifood domain.

Agri-Gaia Goals



- Agri-Gaia creates an open **infrastructure** to easily bring AI innovations to the agriculture and food industry
- Agri-Gaia provides a marketplace and connected (modular) platforms using GAIA-X principles
- Agri-Gaia defines a common **vocabulary** and defines standards for semantic description of digital assets
- Agri-Gaia enables cross-enterprise collaboration while providing protection of trusted digital assets
- Agri-Gaia brings relevant stakeholders together and is an enabler for productive collaboration and integration of AI in practice

Who are the participants of the Agri-Gaia dataspace?



Persons involved:

- Data provider
- Data scientists
- AI-developer
- Al application engineers

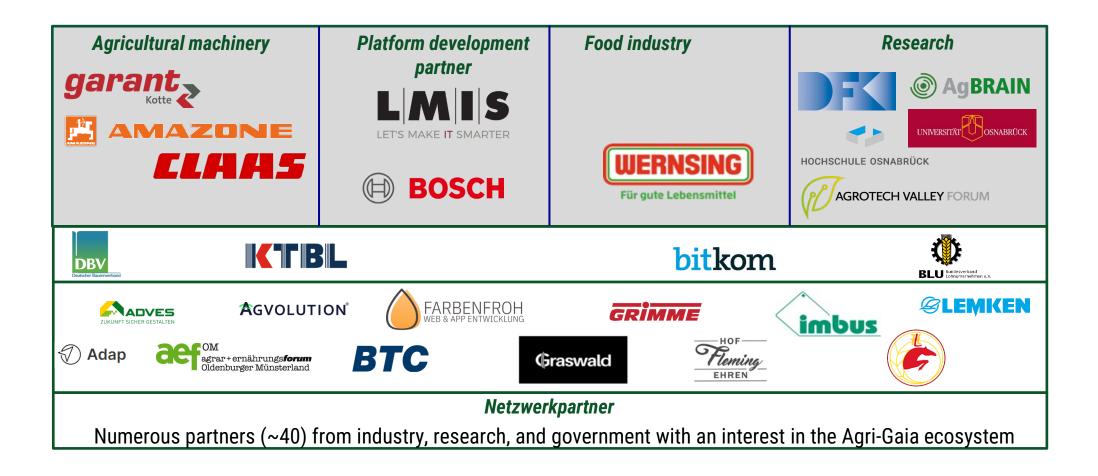
gaia-x

Organisations involved:

- Agtech-companies
- food companies
- research institutions
- data hubs
- FMIS manufacturers
 - •••

Agri-Gaia consortium

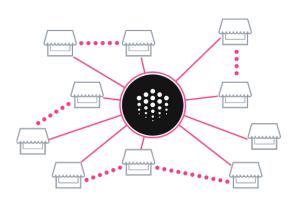
gaia-×





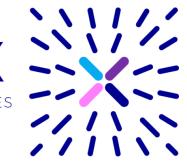
- (To the best of my knowledge) There is no GAIA-X compliant off the shelf implementation yet.
- Several technologies are discussed in the context of GAIA-X that are working towards enabling a GAIA-X compatible dataspace.

Nnexyo





Gaia-X FEDERATION SERVICES GXFS

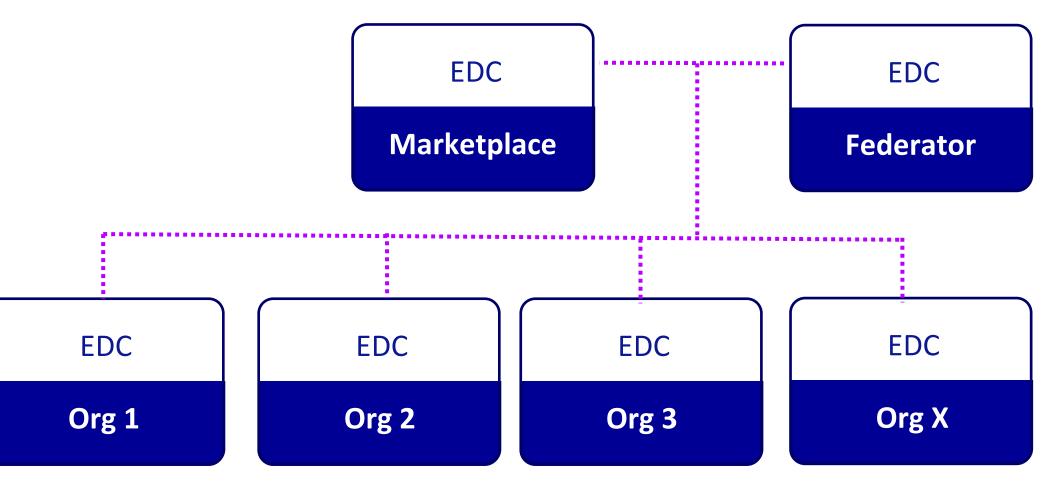




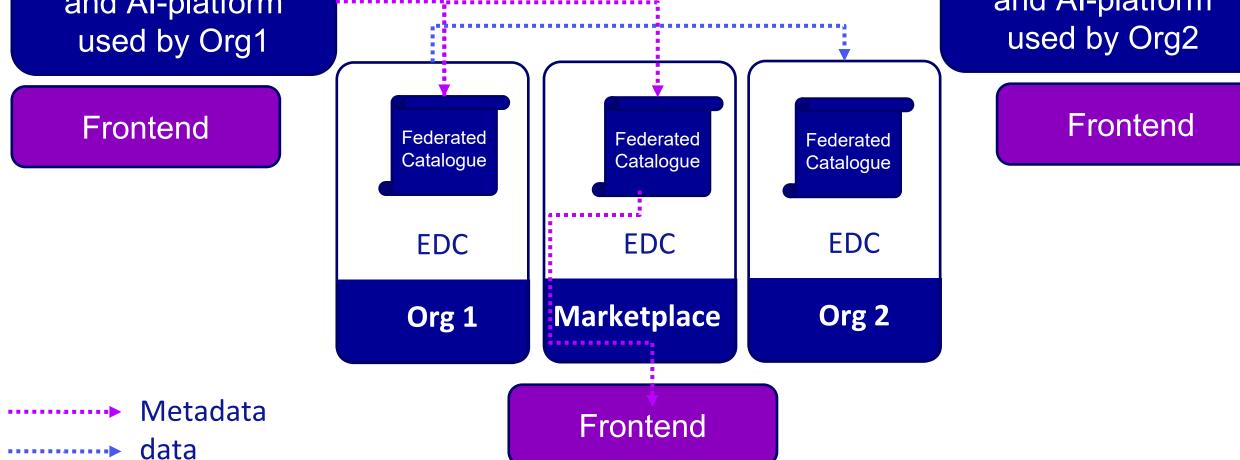
ECLIPSE DATASPACE CONNECTOR



• We choose the EDC.







Agri-Gaia & semantic description



Beside semantic participant description,... (like in any other GAIA-X dataspace) We deal with:

- Semantic labeling of images
- Semantic technologies for metadata description

anno:001 a oa:Annotation ;
 oa:motivatedBy oa:classifying ;
 oa:hasBody agrovoc:c_25910 ;
 oa:hasTarget [

oa:hasSource img:2017-09-19.JPG ; oa:hasSelector [

a oa:FragmentSelector ;
 dcterms:conformsTo <http://www.w3.org/TR/media-frags/> ;
rdf:value "xywh=172,1476,2564,488"]] .

anno:001 a oa:Annotation ;

oa:motivatedBy oa:classifying ;
oa:hasBody agrovoc:c_7847 ;
oa:hasTarget [
 oa:hasSource img:2017-09-19.JPG ;
 oa:hasSelector [
 a oa:FragmentSelector ;
 dcterms:conformsTo <http://www.w3.org/TR/media-frags/> ;
 rdf:value "xywh=2212,900,1420,1080"]].

Agri-Gaia Use-Cases



• Agri-Gaia has 9 Use-Cases that show the application of the Agri-Gaia infrastructure.



Agri-Gaia & synthetic datasets



Agri-Gaia evaluates synthetic training data in

the AI-development loop.





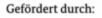






Thank you!

Prof. Dr. Stefan Stiene s.stiene@hs-osnabrueck.de





aufgrund eines Beschlusses des Deutschen Bundestages





Zero Waste

Systemic Innovations Towards a Zero Food Waste Supply Chain

Simon Dalmolen – TNO

Scope

- About 20 % of the food produced in the EU goes to waste!
- 36.2 million people in the EU cannot afford a quality meal every second day (Eurostat, 2020).
- ZeroW directly addresses the challenge of food loss and waste (FLW) by developing and testing a synergetic mix of innovations in real life conditions with the aim to deliver ambitious reductions at all stages of the food value chain from post-harvest to consumption.



gala-x

ZEROW

European project



Facts about ZeroW

Type of action:	IA
Project period:	1 January 2022 – 31 December 202
Total budget:	€ 12 932 881,25
Project consortium:	46 partners from 17 countries

Funded under:

SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

5

Grant agreement no. 101036388

Font: Calibri.

gaia-×



INLECOM COMMERCIAL PATHWAYS

Systemic Innovation Living Labs (SILLs)

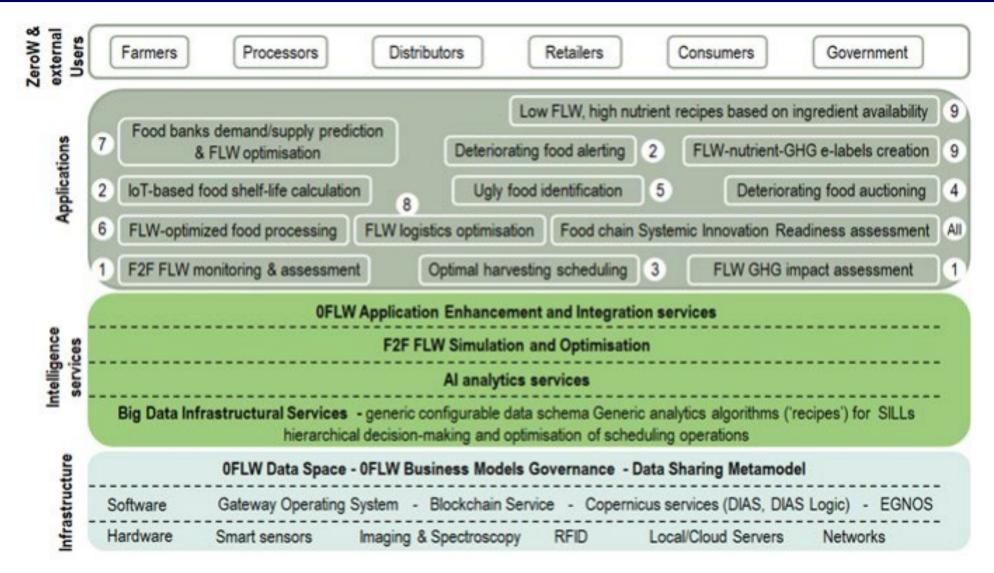


- The methodology that ZeroW uses to coordinate our multiorganizational innovation process is the Living Lab approach.
- It is focused on a systemic co-creation methodology that involves the full scope of food chain actors and beyond: introducing social and governance dimensions to industrial partners in a real-life setting.
- ZeroW has built up 9 real-life Living Labs embedding systemic innovations with the potential to lead to fundamental societal changes in both social dimensions (values, regulations, attitudes) and technical dimensions (infrastructure, technology, tools, processes) and, most importantly, in the relations between them.



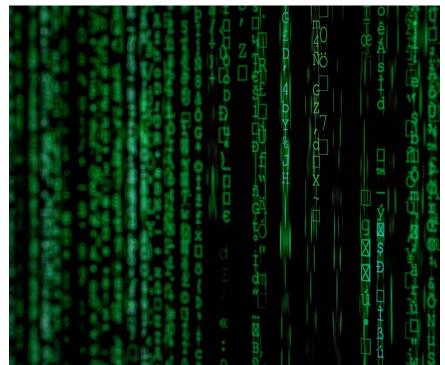
Architecture of open-source ZeroW platform





FLW Data Sharing & the 0FLW Data Space

- ZeroW will establish the OFLW Dataspace by supporting semantic interoperability in the SILLs and supporting scaling through adoption of IDSA standards and methodologies. And towards GAIA-X
- A federating catalogue of compliant data sources will be set up and managed.
- ZeroW will set up the OFLW Dataspace, its catalogue, governance and collaborative business models, starting with and between the SILLs as well as with the existing relevant Data Spaces and data sharing initiatives and developments.
- ZeroW will also make available a Catalogue of demonstrated and OFLW DS compliant intelligent technologies for OFLW applications.

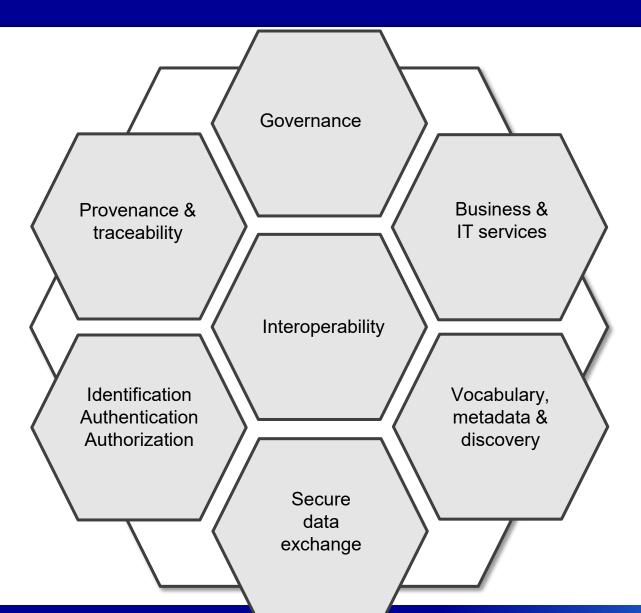


gala-X

ZEROW Data Space

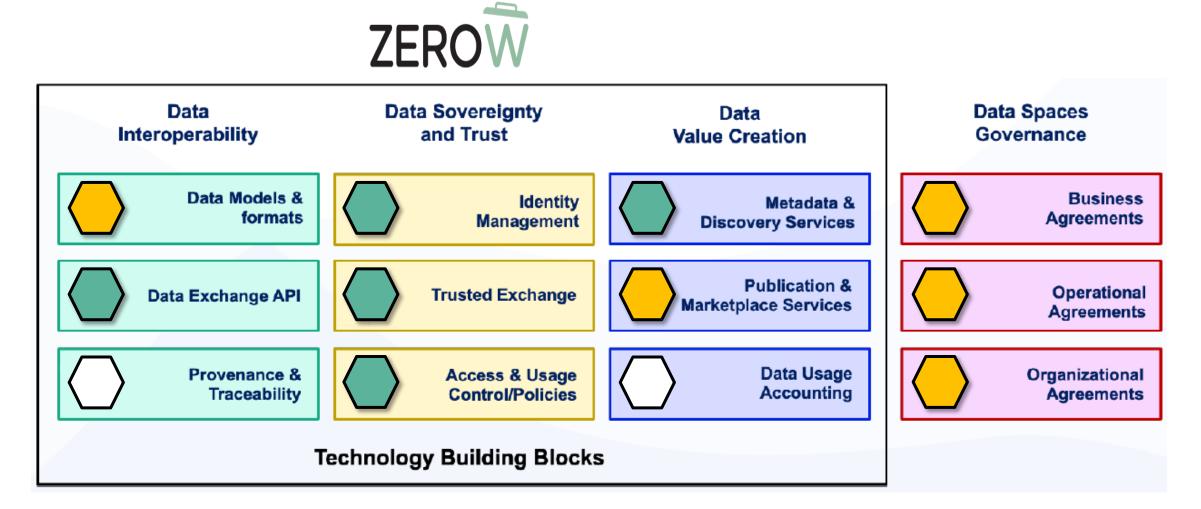


1



OpenDEI building blocks card







More information

- zerow-project.eu
- linkedin.com/company/zerow-project

Thank you!

Simon.Dalmolen@tno.nl



Agro-Meteo real-time data collection over 26.000ha in Romania SysAgria Sensor Mesh Network

Hannelore Valkanov – Syswin Solutions

The Farm



26.000 ha

Corn, Wheat Soy, Sunflower **26 SYSAGRIA**

Monitor 150.000 ha

17 sensors

Microclimate & Soil parameters

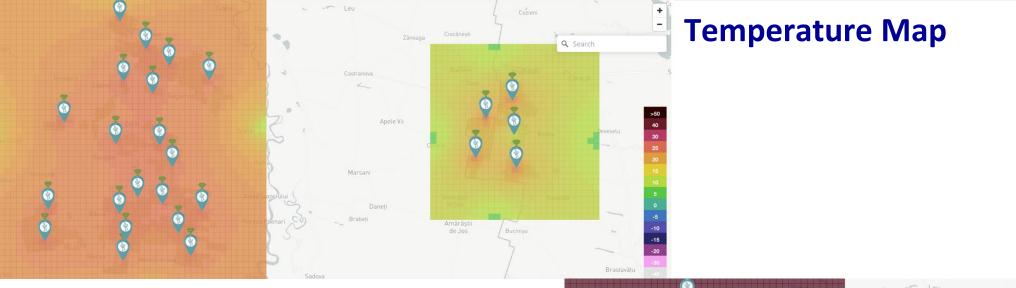
Technology

GPRS and LoRa and Nb-IoT

Data samplingData StorageData CollectionData Volume15/60 minutesAzure Microsoft2020-20225126MB

Data Interpolation

gaia-×





Precipitation Map

The Solution

Real time ALL-IN-ONE system

111111 gaia-x

NNN177

HARDWARE

Meteo Module Pest & Pathogen Alert Module Soil Analysis Module –SysCrop NPK

Irrigation & fertilizer dosage reccomendation correlated with yield estimation

SOFTWARE

Complex agro-mathematical models

Big data analysis

FUNCTIONS

Real-time field data collection with sensors Data input from the experimental field by the farmer

Decision Support

gaia-×

Real-time alerts for pests and pathogen occurrence Algorithm corrections based on field feedback

Yield estimation reports

Reports of the NPK assimilation rate

Soil health by monitoring the NP-Balance

The Future

gaia-x

Why will farmers want to use SYSPEST ALERT & SYSCROP NPK? It's EASY

EASINESS

Easy to understand and use as a decision support platform

AFFORDABILITY

Financeable through different programs

SUSTAINABILITY

Reduction of agrochemical waste, water waste in line with the Green Deal directives

YIELD POTENTIAL INCREASE

Yield estimation and intervention recommendations throughout the crop cycle





Thank you!

26th Biharia, 3rd Floor, Sector 1, Bucharest, Romania Mobile +40723330771 h.valkanova@syswin.ro www.syswinsolutions.com

Session 2 Use Case part 1 & Discussion Panel, Data Space Today

gaia-x

Discussion Panel, Data Space Today

Stefan Stiene - Professor, Hochschule Osnabrück Simon Dalmolen - Senior Researcher, TNO Doris Marquardt - Programme Officer, European Commission, DG AGRI Hannelore Valkanov - Founder, SysAgria Marko Turpeinen - CEO, 1001 Lakes Natalie Bertels - Valorisation Manager, imec-CiTiP-KULeuven Daniel Azevedo - Director of Commodities, Trade and Technology, Copa-Cogeca

Jurgen Vangeyte – Moderator



Cooperation of Agdatahub & Djust Connect

From regional data spaces towards a federated European dataspace

Sébastien Picardat – Agdatahub (CEO) Jurgen Vangeyte – ILVO / Djust Connect

Agdatahub and DjustConnect, 2 operators driven by farmers

gaia-x

1

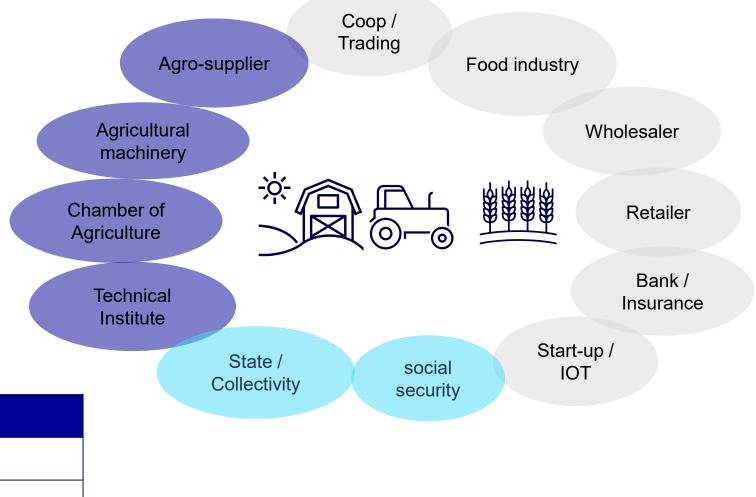
A very large amount of **heterogeneous**, **competing**, **non-interconnected** and **sometimes inaccessible data**, scattered among the partners of the farms

Similar needs for sharing data between stakeholders

New role of data intermediary (DGA)

Similar uses cases : Traceability, grain logistic optimization, carbon credit valorization...

Number of actors involvedImage: Constraint of actors involvedFarms10 000 000Farm partners500 000



Data4Food project



Horizon Europe project

Goals

To improve the data economy for food systems by expanding its definition, mapping its development, performance and impact to create new insights and opportunities.

Case study « Agdata interoperability »

Explore the possibilities offered by the GAIA-X, for compliance, sovereign data exchange and federated access under different data sharing architectural patterns (centralized and decentralized).



Technical

Investigate and promote the possibilities offered by the GAIA-X for <u>decentralization and federation</u>

of the services but also support the connection with the GAIAX working group for agriculture.

Business

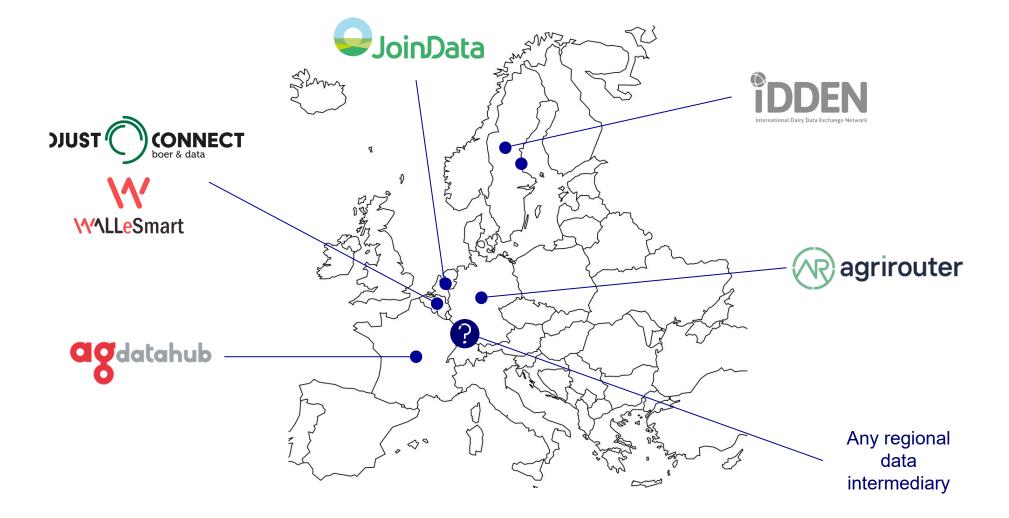
Investigate business models to allow data intermediaries to cooperate.

Explore ways to support data providers in determining the value of their data.

Governance

Explore the opportunities of a <u>federated governance structure</u> under different data sharing architectural patterns (centralized and decentralized) that will define the scope, the openness, the technical interfaces and the 'federated' services





Implementation of use cases



Agricultural use cases in progress

- Origins of feed for the dairy herd
- Traceability for the French maize sector
- Grain logistics optimization
- Soybean industry in France
- Plant health surveillance
- Weather data standardisation

Potential use case

- INPUTS: plant and animal sectors
- Agricultural practices and traceability
- Upstream agricultural: traceability of veterinary drugs
- Precision agriculture: IOT and Decision Making Tools
- Agricultural machinery: expand the scop of Isobus system
- Pilot, buldings and environmental parameters
- Unique farm identification
- Plant and animal productions and bioeconomy





Exploiting Agri data in an Alpine use case

Raffaele Giaffreda – Fondazione Bruno Kessler (FBK)

Alpine Agri Data Use Case: the contextual background

- Apple orchards, vineyards
 - water management
 - frost protection
 - incentivising virtuous behaviours



TRENTINO

gaia-x

Agricultural water use in a mountain context



 many stakeholders: water management consortia, farmers, agtech providers, energy (water-based electricity generation), tourism (water reservoirs interests)







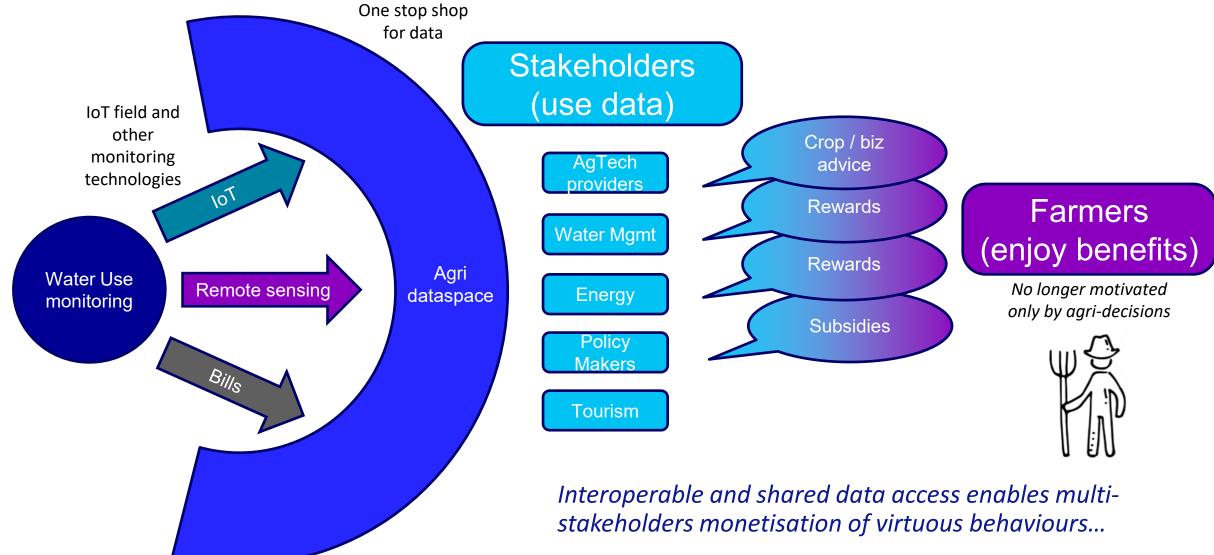
Huge savings potential

gaia-x

- Water balance for tree crops is a moderately complex problem yet, potential for huge savings
- Individual AI leveraging data aggregation
- Collective data for supporting cross sectorial policies
- Innovative use of cross-application data collection:
 - incentive-based system based on blockchains and smart contracts rewarding water savings based on water value set by stakeholders

Incentivising virtuous behaviours

gaia-x



Further extensions to the concept

- gaia-x
- Extensions to sustainable farming practices is one (few) step(s) / sensor(s) / dataspace(s) integration away...
 - DATA: Irrigation, pesticides, energy, CO2 emissions etc.
 - USAGE: Risk management, incentives, CAP subsidies, traceability for quality labelling (i.e. POD, PGI)
- Strategy: background monitoring with no impact on operational farm business
- Tragedy of commons and what data is shared: producing evidence of virtuous behaviours



Thank you!

Contact details: Raffaele Giaffreda rgiaffreda (at) fbk.eu



Session 2 Use Case part 2 & Discussion Panel, Data Space Tomorrow

gaia-x

National farm management platform (data-centric decision support services for farm management)

Maciej Zacharczuk – Project leader Greater Poland Regional Agriculture Advisory Center

eDWIN project

gaia-×











Advisory and Decision Support Online Platform for Integrated Plant Protection

Project period	Founding
from 1 June 2019 to 31 Oct 2022	Digital Poland Program for 2014-2020,
	E-administration and open government axis

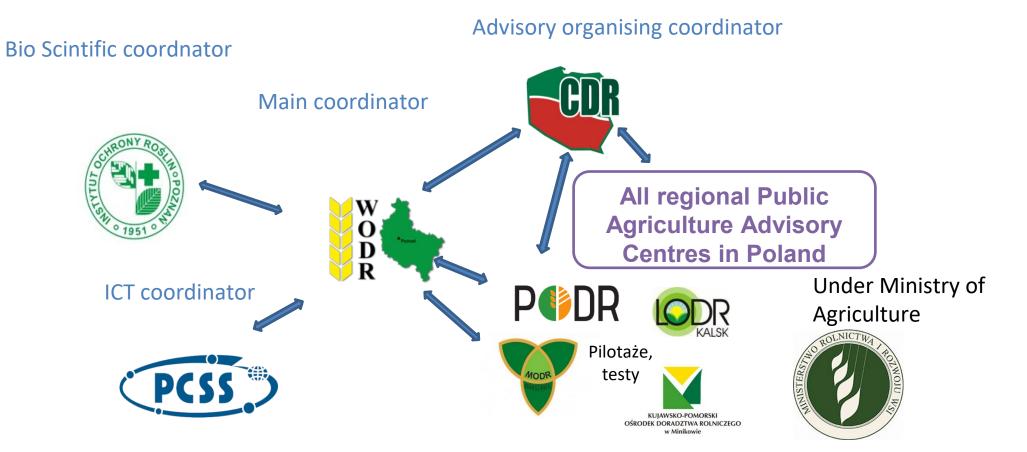
Develop of a national IT system for plant protection by **31.10.2022** including 4 public e-services:

- Virtual farm
- Tracing the origin of products labelled as originating from agriculture and plant protection products used
- Risk reporting
- Sharing meteorological data

Partners

gaia-×

Consortium: 19 partners



1



- **Meteorological data sharing** a service that enables the acquisition of meteorological data, crucial for agriculture and rural areas, aggregated to the local level; *recipients: local authorities, public and scientific institutions, others (launched 4 June 2022)*
- Virtual farm the service will address a multicontextual issue related to problems identified by crop protection users;

recipients: farmers (launched 4 June 2022)

• **Tracing the origin of products** labelled as originating from agriculture and plant protection products used;

recipients: consumers (scheduled to be operational by 31 October 2022)

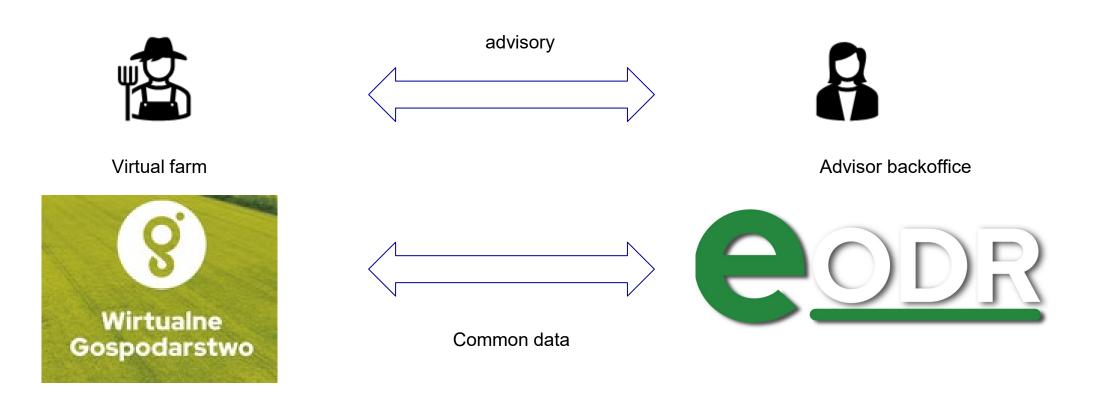
Risk reporting – a service enabling the generation of reports, both in tabular and graphical form;

Recipients: public administration, scientific institutions, local authorities (scheduled to be operational by 31 October 2022)

Advisory platform

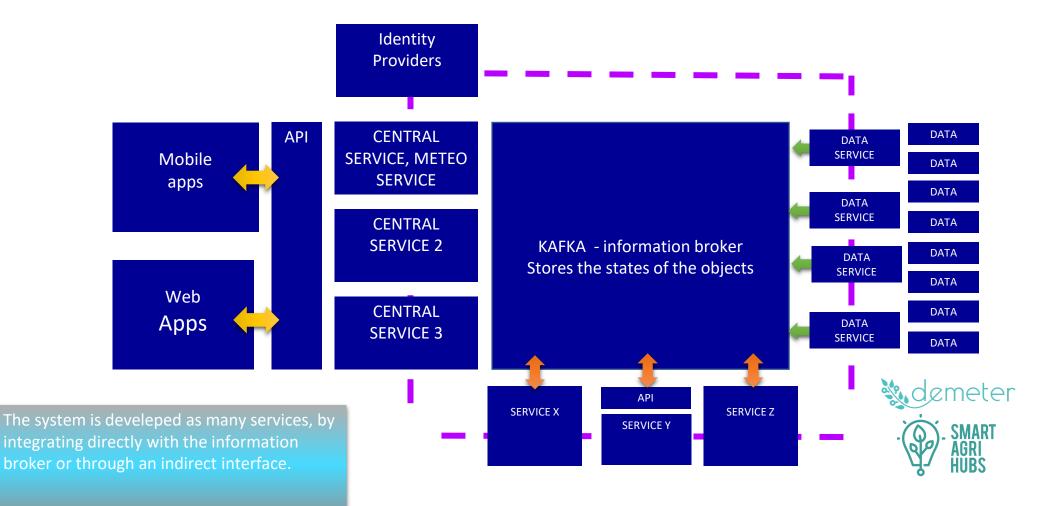


FARMER <-> ADVISOR COOPERATION



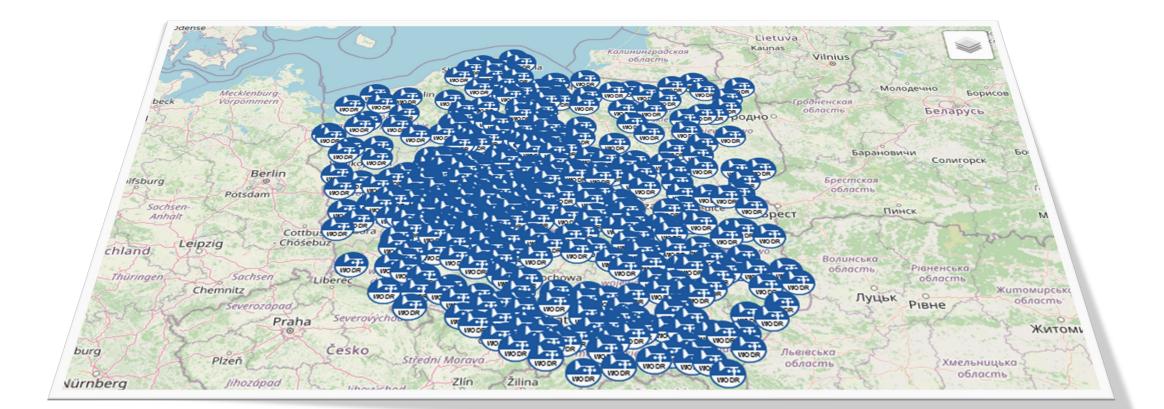
Advisory platform





Infrasrtucture, meteo stations





Stations in numbers:

Current state: 549

During the integration: 63



Public access, provided on the edwin.gov.pl website and includes:

- Map of stations
- Location of the nearest stations
- Tabular data in several time aggregates
- Export to file

A software interface (API) for data capture by institutions is currently under development



Integrated data



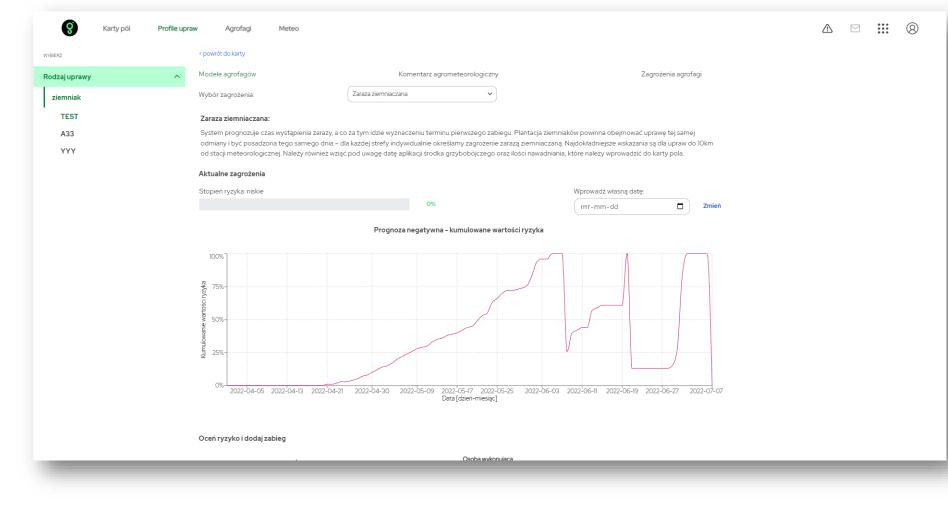
Νο	Data and service source	Institution	
1	Service and database of pest and disease threats	Institute of Plant Prot.	
2	Plant protection products, labels of plant protection products	Ministry of Agriculture and Rural Development	
3	External agri-meteo data	Meteorological institute and others	
4	Registered varieties of arable crops	COBORU	
5	Meteo prognosis	ICM	
6	Farm and plots data	Payment agency	

DSS and pest risks



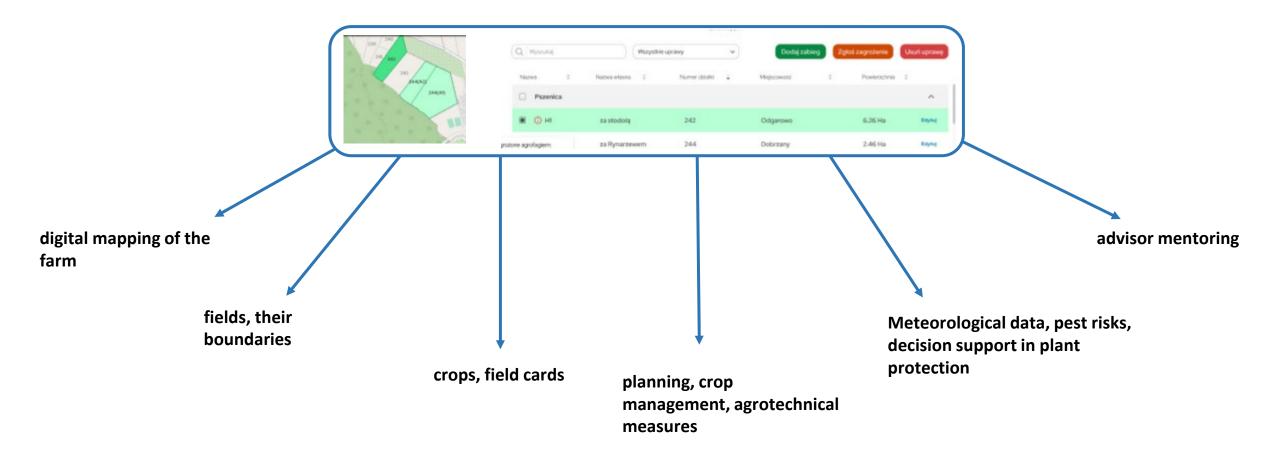
Agrophage models currently available:

- Potato late blight
- Potato beetle
- Beet weevil
- Pests in beets
- Horsetails in cereals



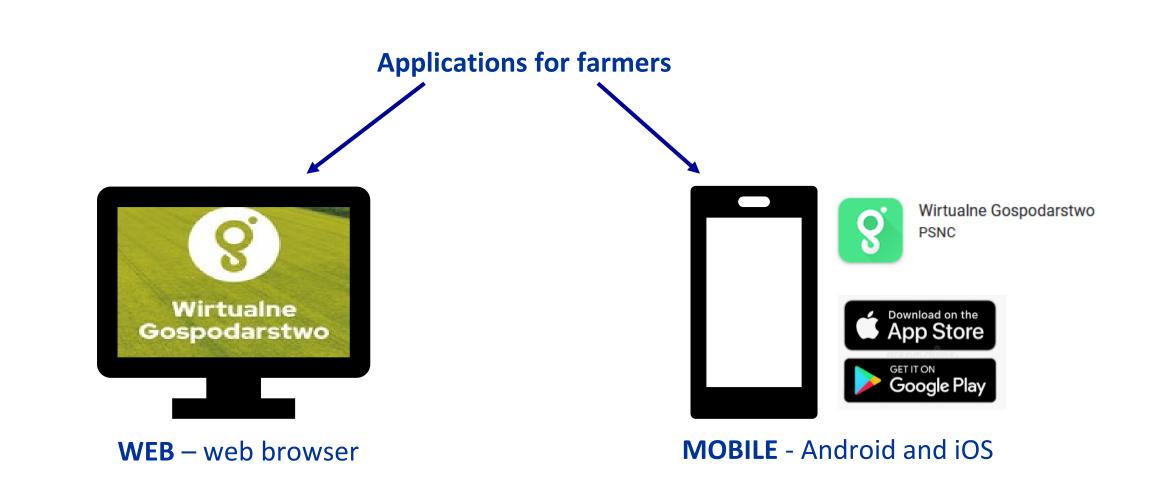
Virtual farm





Virtual farm





The eDWIN system is designed as a platform:

- Interoperable
- Fully open
- Based on OpenSource standards

Planned:

- To expand the system with further modules
- Providing space for other applications within the platform

By basing the system concept on modules that are fully independent of each other, maintaining the openness of the entire platform will be significantly simplified.

gaia-x

Open architecture and complementarity with other projects







Thank you!

Maciej Zacharczuk Wielkopolska Agriculture Advisory Centre in Poznan Project Manager maciej.zacharczuk@wodr.poznan.pl phone +48 723 678 001 Session 2 Use Case part 2 & Discussion Panel, Data Space Tomorrow

Applying Gaia-X to Agriculture Data through the UdL Science and Research Portal

gaia-x

Roberto García – Universitat de Lleida (UdL), Spain



- Agricultural digitalisation requires lots of data
- Reluctances:
 - Insecurity, lack of transparency, power unbalances, no perceived benefits...
- Mandatory sharing or auto-regulation, codes of conduct
- *"EU Code of Conduct on Agricultural Data Sharing by Contractual Agreement"*, 2018
 - Originator: generates data as a result of its activity, even if commissioned its collection (e.g. farmer)
 - Originator Rights: to control data use and benefit from it
 - Sharing should be explicit, express, and informed





- Code of Conduct is not enough:
 - Combine it with regulatory and technical means to scale agriculture data sharing —> EU Data Spaces initiative
- Key features of a common European data space:
 - A secure and privacy-preserving infrastructure
 - Trustworthy data governance mechanisms
 - Data holders **control** who can access their data
 - Data reused against **compensation**, including remuneration, or for free
 - **Open** participation



- Enable technical control over the data and require consent for data usage, while preventing centralisation
- Compute-to-Data (CtD), Trusted Execution Environments (TEE), Blockchain and Self-Sovereign Identity (SSI)
 - Control data remains on premises or on trusted environment, computation goes to data and extracts value without revealing data, and just after explicit consent
 - Ownership cryptography provides technically guaranteed data selfsovereignty
 - Transparency data transactions recorded on blockchain, linked to actors who sign them and, thus, non-repudiable and auditable

https://udl.portal.minimal-gaia-x.eu

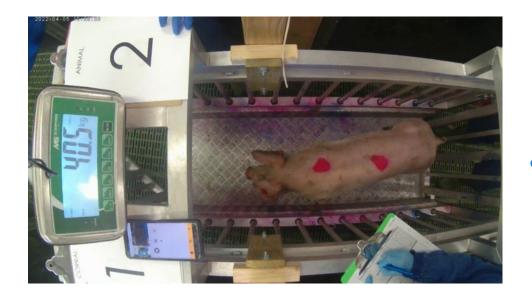
	publ	lish account	browse	
Current Work: Blockchain-based technologies enforcing ownership and privacy	An open resear	ch and science platform followi , accessibility, interoperability ar	ng the principles of	
		ocean		Compute-to-Data: Privacy/Ownership "by design"
	A doct of a Control of a structure	ALCOMMENT Provider tracs astrong and	portal providers	Loxenized algorithm data scientists data service consumers Imark contracts data portals based on smark contracts Imark contracts access control based on smark contracts
Data Audit Trail for Academia Different Monetization By Seinering data sets and using such anager a comparison of the set of the data sets of the servers, is beged automatically and sets and the off the set of the data sets of the creater a data set of the sets and the set of the data sets of the set of the data sets of the sets and the sets and the set of the set of the data sets of the set of the data sets of the sets and the sets and the sets and the sets of the sets of the data sets of the sets of the sets of the data sets of the sets of the sets of the data sets of the s	1 COM © CALATORIES CALATORIN	Important "Important" in the law's constraints of the law's constraints of the law's constraints of the law of	data owners	data asset stays on-premise

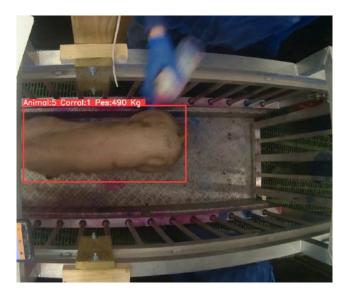
Universitat de Lleida's participation is being supported by project PID2020-117912RB-C22 funded by:





- Farmers share **pigs weighing pictures**, including scale digits
- Researcher use pictures to train an automatic weighing algorithm
- Farmers have access to automatic weighing algorithm

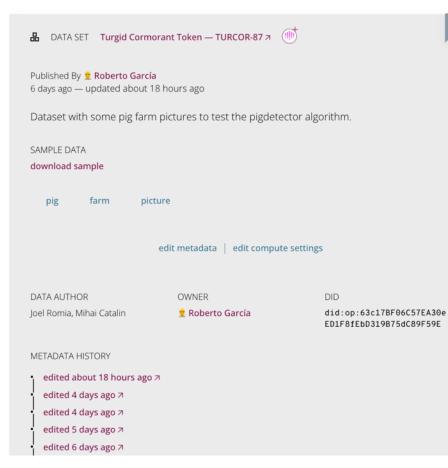






Pig Farm Sample Pictures

😫 GAIA-X Testnet



Pig Farm Sample Pictures

S

Only selected algorithms are allowed to run on this data set. Updating these settings will create an on-chain transaction you have to approve in your wallet.

d Algorithms	
earch by title, datatoken, or DID	
Apple-Detection-Latest 71 LUMSMA-58 did:op:a6ed219784/A94/5888e135b524616e38Eb03801	Free
Pig Detection ≫ QUISHE-5 did:op:8322cc198470C556edWF9ddF11C9bE5s3Ae34Cd	Free
Pigs-detector 71 IWVMAN-22 d1d:op:12f4E72090f33592c33Ec003cdF202aefC142405	Free
Pigs 71 ARU0TT-69 did:op:2802b10Ff772cE99890f4a83500106030A6D4e8a	Free
Pig Detector ⊼ NOTWAL-23 did:op:2527Ff30f7a89d61DA12a1EDa5671f4029783015	Free
Pig Detection <i>R</i> LUMSXA-58 did:op:836480C73630025F706419005036095fA957809a	Free
Pig Detection ↗ LUMS8A-S8 did:op:54e01446347465F1Ad3C2eE99471ec945C0371fe	Free
Descriptive statistics for tabular data ↗ cALSMA-66 did:op:8306C13376E53ba969f73e218258281e1700C872	Free
Count Lines 7 CALSHA-66 did:op:6ED8E15f7314dC306886C382517D374356E689De	1



Allow any published algorithm to run on this data set.

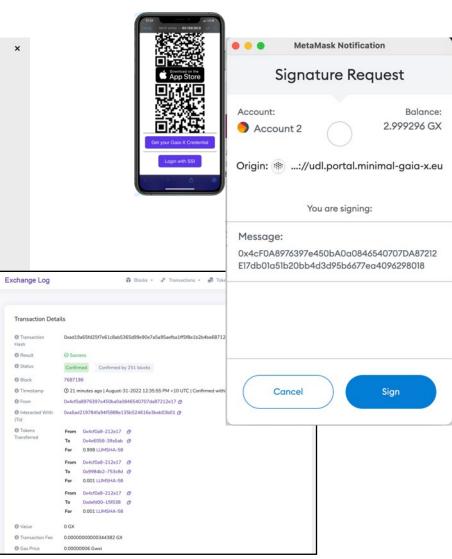
Allow any published algorithm

All Algorithms

submit cancel



× Job finished spend it back to its publisher and pool. Pig Farm Sample Pictures 🤊 TURCOR-87 | did:op:63c17BF06C57EA30eED1F8fEbD319B75dC89F59E If you consume a service offering, your wallet address Pig Detection 7 QUISHE-5 | did:op:8322cc19847DC556ed9FF9ddFf1C9bE5a3Ae34Cd results.zip algorithm.log Results are stored for 30 days. CREATED FINISHED 1 day ago 1 day ago JOB ID Exchange Log db01a51b20bb4d3d95b6677ea4096298 O Transaction Hash Result O Status Block @ Timestamp 0000 O From Interacted With (To) Tokens Transferred 0 0 0



order compute job

For using this dataset, you will buy 1 TURCOR-87 and immediately spend it back to the publisher and pool. Additionally, you will buy 1 QUISHE-5 for the algorithm and

and public key will be stored permanently on-chain on the Gaia-X testnet. For more information, please refer to our privacy policy.

Your Compute Jobs	hide 🔨	
STATUS	ACTIONS	FINISHED
JOB FINISHED	show details	1 day ago
JOB FINISHED	show details	1 day ago
JOB FINISHED	show details	4 days ago
JOB FINISHED	show details	4 days ago



- Inspiration from EU Code of Conduct, using Gaia-X to scale it while technically facilitate:
 - Data sovereignty, ownership, trust
 - Fair compensation
- Align with Legal Framework:
 - Data Governance Act, Data Act, Artificial Intelligence Act,...
- Consider ethical aspects:
 - Value Sensitive Design
- Explore governance opportunities to empower weaker players:
 - Data Cooperatives, Trusts, Unions...
 - ...or Decentralised Autonomous Organisations (DAOs)



Thank you!

Roberto García (roberto.garcia@udl.cat)

Session 2 Discussion Panel, Data Space Tomorrow



Roberto García - Associate Professor and Deputy Vicerector for Research and Transfer, Universitat de Lleida Daniel Azevedo -Director of Commodities, Trade and Technology, Copa-Cogeca Raffaele Giaffreda - Chief IoT Scientist, FBK Sébastien Picardat - CEO, AGDATAHUB Jelle Hoedemaekers - Expert ICT Standardisation, Agoria; Doris Marquardt - Programme Officer, European Commission, DG AGRI Maciej Zacharczuk - Project leader Greater Poland Regional Agriculture Advisory Center

Jurgen Vangeyte – Moderator



Thank you!

Gaia-X European Association for Data and Cloud AISBL info@gaia-x.eu