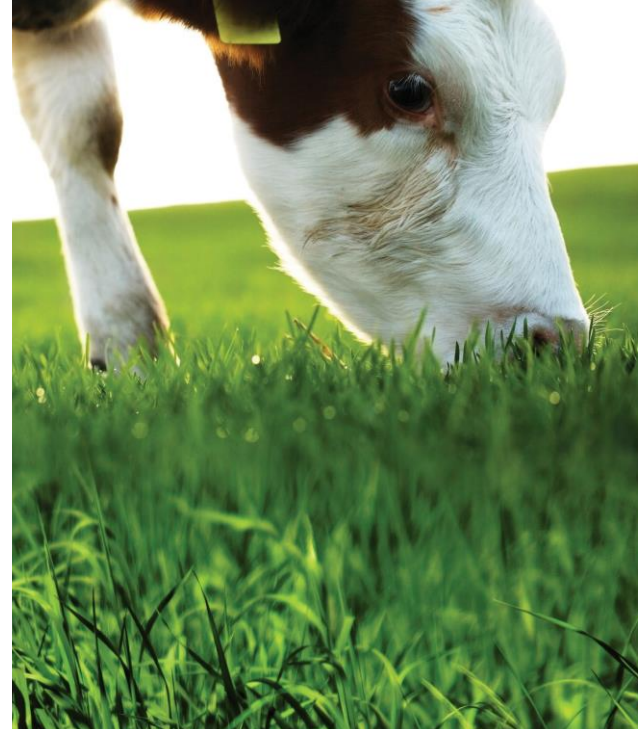




Learnings from 4 years of piloting digital technologies across European farms

Dr Srdjan Krčo

Hannover, 10/11/2023



DunavNET – Accelerating digital transformation

Established in 2006, HQ in Dublin (Ireland), development in Novi Sad (Serbia)



Co-founders of international IoT associations, **regular keynote speakers** at international events, EU and ITU experts for IoT



fleetNET's **FIRST customer** in 2011



TagItSmart, €7mil. IoT project, managed by DNET, started 2016



Collaboration with **Microsoft** started 2015



glueNET with **Henkel** since 2018, deployments in Heineken and Carlsberg



First AI solution for poultry farms deployed 2018



Working with Africa, IoT and entrepreneurship (**ACEIoT**)



Collaboration with **SAS**, since 2019



Invested over 5 mil. EUR into **creating own IPR** in IoT/AI domain



Spin-off smart city solutions into a joint venture, 2021



30 IoT developers and experts



Microsoft IoT is already delivering tangible results across industries

Tetra Pak

Tetra Pak's IoT business results show down-time cut down by up to 48 hours for each packaging line saving up to 30,000 Euros for customers."

FINNING

"Finning's IoT solution has enabled customers to quickly solve business problems from a dashboard, transport more than 1 million additional tons of cargo via machine learning, reduce fuel consumption by reducing idling by 17%, and increase ROI and competitiveness for the long term."

Rolls-Royce

Cutting fuel usage by 1 percent could save **\$250,000 per plane per year**

Johnson Controls

Chillers restart **9x faster** than unconnected equipment, avoiding more than **\$300,000** in hourly downtime costs

HERSHEY'S

Ensure the licorice extruders on Twizzler's production line are **performing at peak optimization, saving over \$500K/year** on licorice alone.

RAC

By analyzing driving trends on its own patrol fleet, RAC has **reduced its accident rate by 25%**, and **reduced fuel usage by 20%** - reporting annual savings of **\$1.8 million**

DUNAV NET

By telling farmers such things as when to irrigate, how to control diseases and where to fight pests, agrONET provides an action plan to maximize efficiency. This solution has seen yield increases of 30% due to data & machine learning informed irrigation decisions and reductions in water use by 20%."

Rockwell Automation

Improves access to production and supply chain **data** worldwide, reducing downtime costs by as much as **\$300,000 per day**

thyssenkrupp

Gathers data from sensors and systems to create valuable business intelligence and **reduce downtime by 50%**

SUSTAINABLE DEVELOPMENT GOALS



DEMETER overview

15 member states

18 Countries

60 Partners

318k hectares of land

Working with **5.7k** Farmers

29k Sensors used across **80** sites

9.2k Devices & **131** Large Machinery

20 Pilots

5 Agri Sectors

Global Outreach:

69 farming associations

47 Countries

1.5 Billion People

Multi-Actor Approach

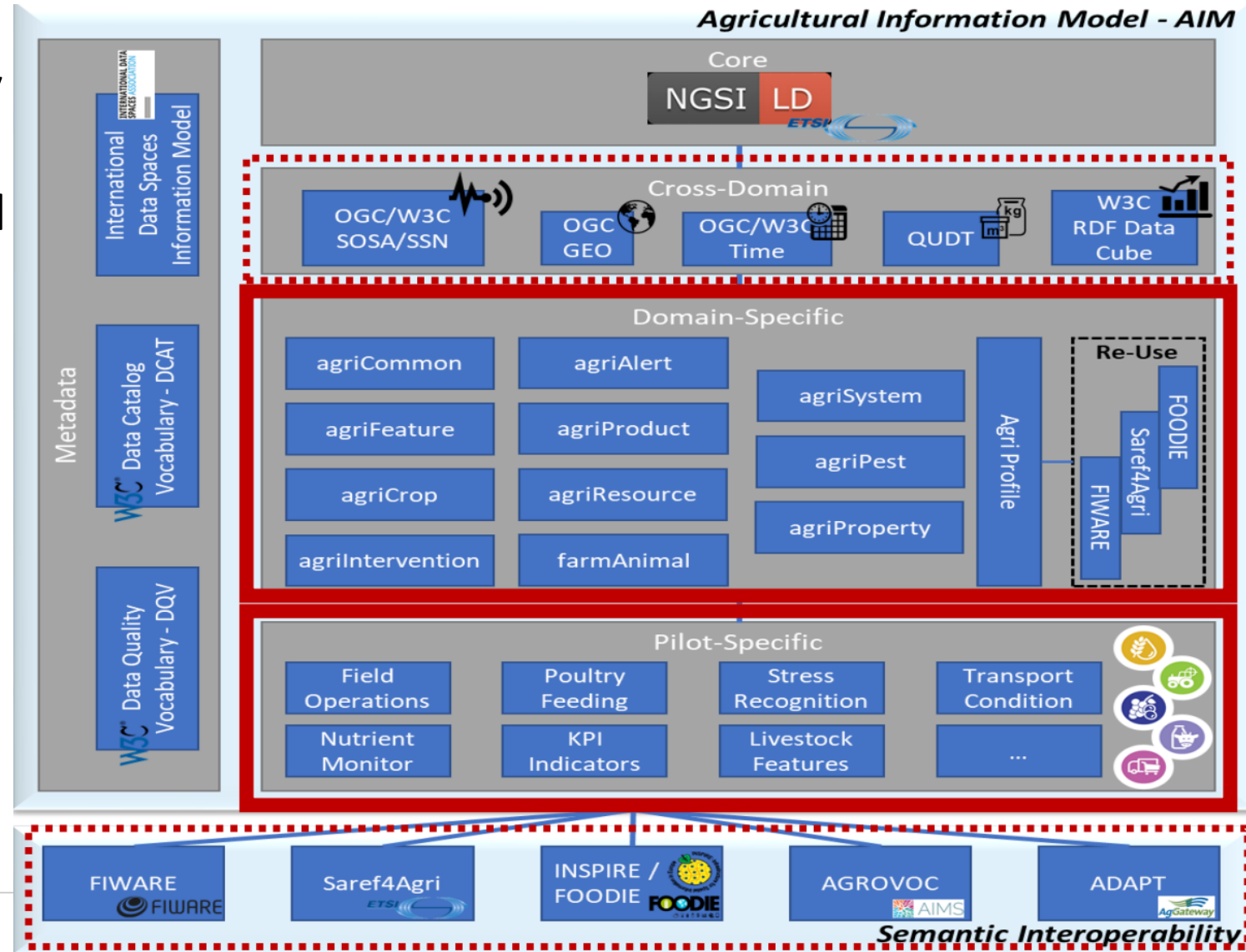
Using **Practical skills** & **knowledge** to target real life needs, problems & opportunities.





AIM – Agricultural Information Model

- Enabling a semantic interoperability data space
- Semantic mappings to FOODON and eCrop and realigned to FIWARE (SmartDataModels) and SAREF/SAREF4Agri



In-Service Condition Monitoring of Agricultural Machinery

Challenge:

- Demonstrate the potential of an onboard in-service condition monitoring of agricultural machinery.
- Monitoring of engine and after-treatment functionality to check if everything is working correctly.

Solution/Innovation:

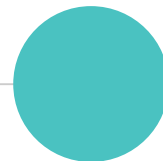
- Engine and after-treatment data logged with 10 Hz in real time and analyzed
- Results visualized, easy to understand conditions of the machines



Sensor	Status	Error	Error Detail	Note
Aftertreatment NOx Out	Yellow	Only defaults	-	Instruction XYZ
Coolant Level	Red	-	-	-
Crank Case Pressure	Green	Values always ok	0 times error-prone	change nothing
DEF Dosing Temperature	Red	Value too high, Sometimes ok	16 times error-prone	Instruction XYZ
DEF Tank Level	Red	Value too high, Sometimes ok	The DEF tank level fall below the minimum value at 2021-11-09	Instruction XYZ
DPF Outlet NOx Sensor Signal Status	Green	ok	ok	Instruction XYZ
DPF Outlet NOx Sensor Status	Red	-	-	-
DPF Regeneration status	Red	-	-	-
Engine Charge Air Cooler Outlet Temperature	Yellow	Value too high, Sometimes ok	16 times error-prone	Instruction XYZ
Engine Coolant Pressure	Yellow	Sometimes ok	-	Instruction ABC
Engine Coolant Temperature	Red	Too many value changes	80% of the time error-prone	Check cooling system
Engine Oil Pressure	Green	Value ok	0 times error-prone	change nothing
Engine Oil Temperature	Red	Values partly too high, Sometimes ok	ABC	Check machine before driving again. Be careful, this is critical.

Deployed in: Germany

- *Bavarian State Research Center for Agriculture (> 100 ha)*
- *Hofgut Neumühle (> 100 ha)*



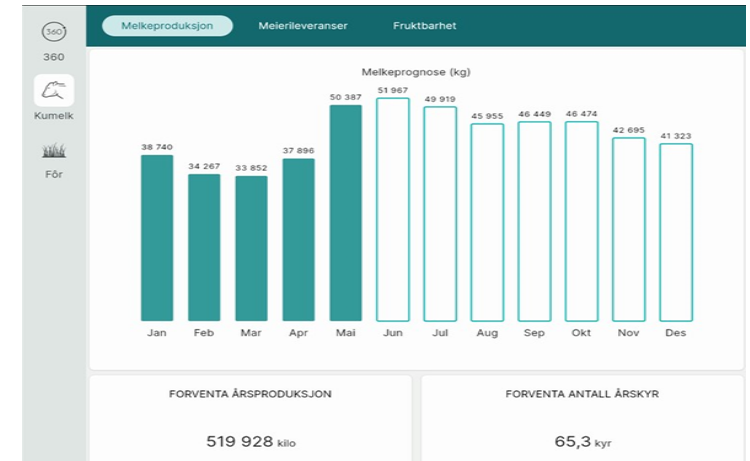
Dairy Farmers Dashboard for the entire milk and meat production value chain

Challenge:

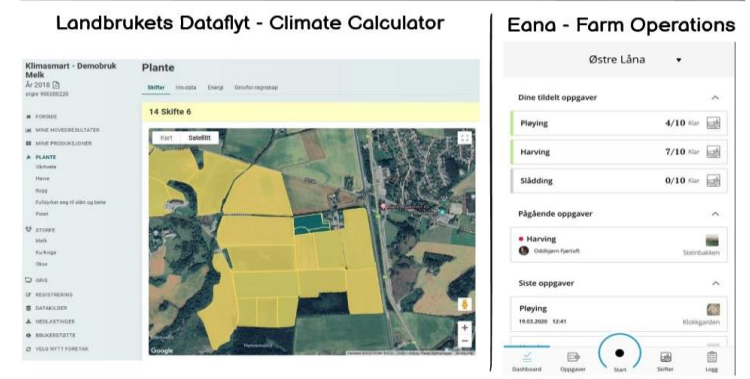
- **Digital overload:** Farmers troubles with an increasing number of digital solutions and production requirements, including greenhouse emissions.
- **Sensor data and AI** adds to this complexity

Solution:

- **A farmer's digital dashboard** based on data sharing among companies the farmers cooperate with, that support:
 - milk yield prediction and herd management for dairy farmers
 - measurement of greenhouse emissions on the farm
 - benchmarking and visualization components for overview on the farm



DEMETER Farmer's Dashboard





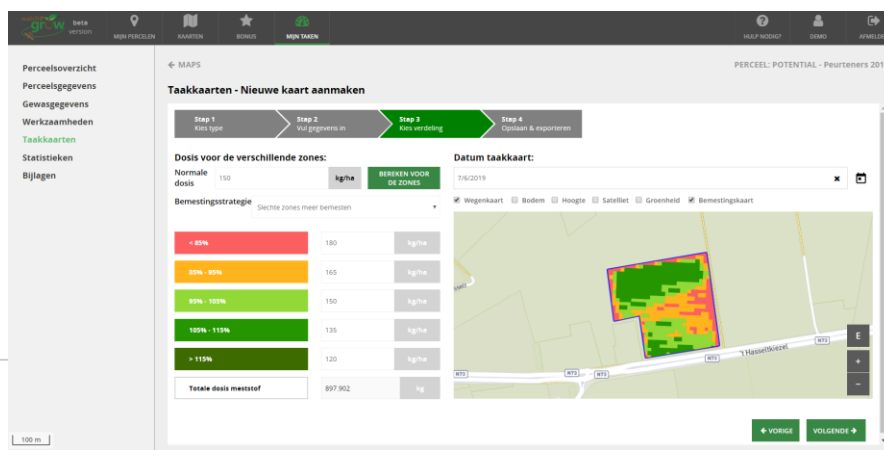
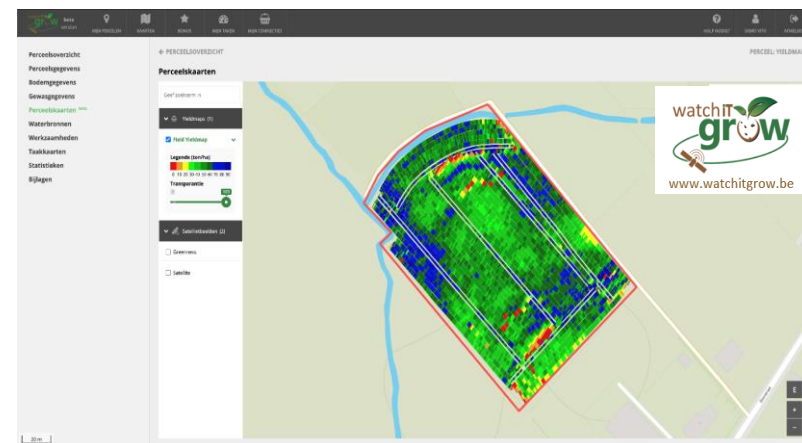
Open platform for improved crop monitoring in potato farms

Challenge:

- More connected field machinery → make sense of the data!
- Need for easily accessible decision support tools for farmers

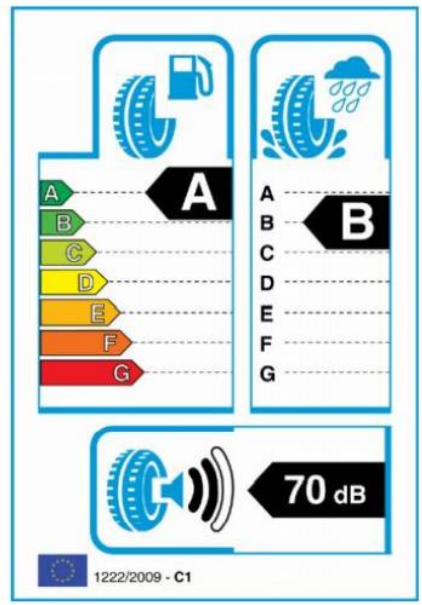
Solution/Innovation:

- Automatic and standardized exchange of yield data between AVR Connect and WatchITgrow platforms using AIM standards
 - Visualize AVR yield maps
 - Compare yield and other data (satellite images, soil maps, weather data)
 - Create task maps for variable rate fertilization or irrigation
 - Get yield estimates for their fields

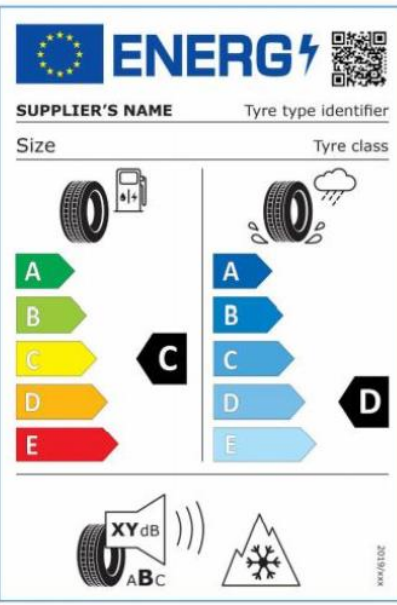


Supply Chain Transparency (poultry and winemaking sectors)

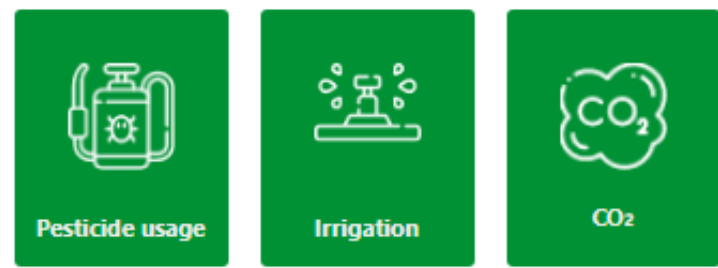
2012 EU Tyre Label
Regulation 1222/2009



2021 EU Tyre Label
Regulation 2020/740



Batch number: 124
Number of bottles: 600
Sulfur [g]:
Type of wine: Red
Location:
Crop type:
Variety: Vranac Pro Corde
Pesticides - the last treatment: 20.8.2023.
Harvest date: 30.9.2023.
Sugar content [%]:
Acid:
pH:
Temperature [°C]: 13
Energy label:



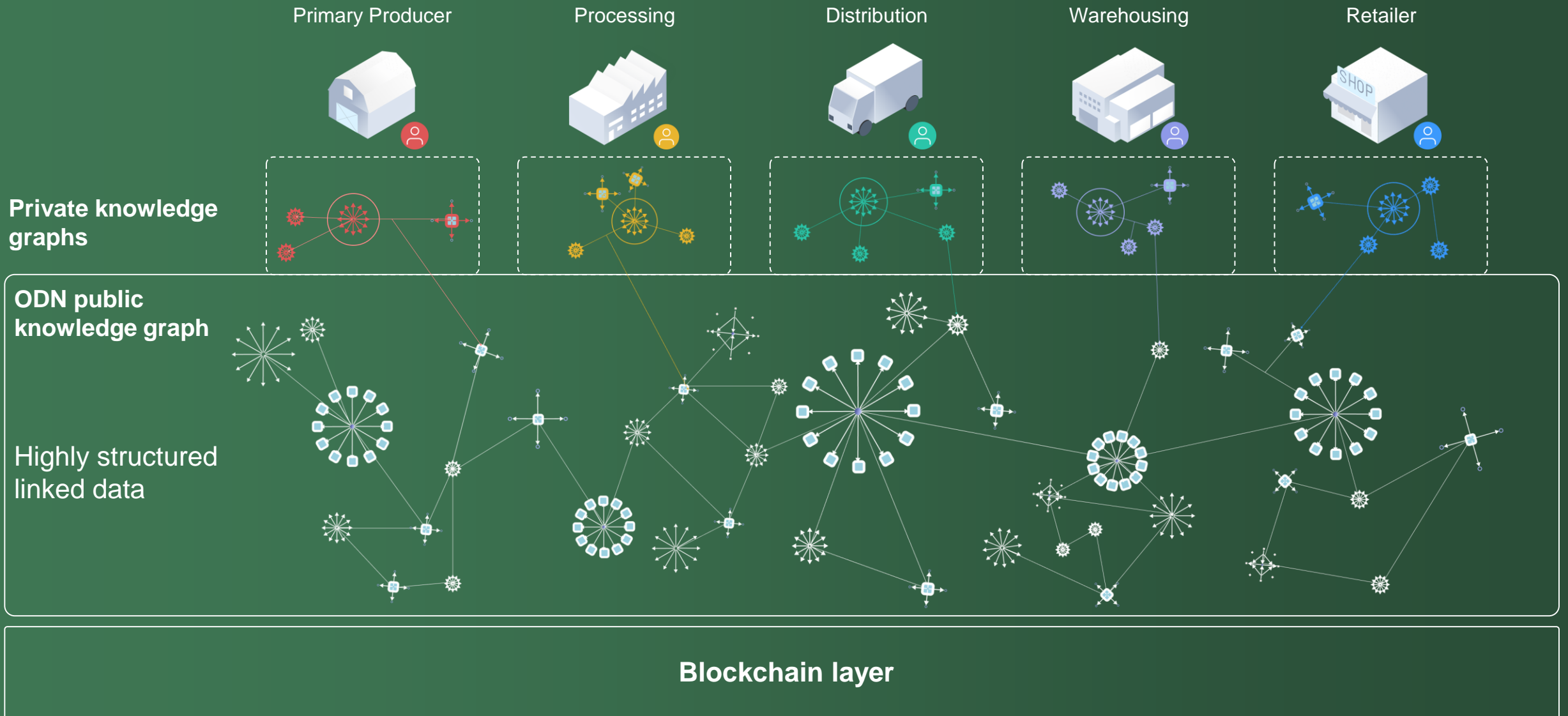
Low environment impact
 Medium environment impact
 High environment impact

Producer: Agroprodukt Šinković
Type: Meat Provenance
Hybrid: Ros 308
Cycle: 30.3.2022.
Environmental conditions: Optimalni
Vaccines: Da
Transport conditions: Optimalni
Energy label:



Low environment impact
 Medium environment impact
 High environment impact

Integrating data through the Decentralized Knowledge Graph



Collaborate closely with farmers



Farmers are busy

- *Recognize and accommodate farmers' time constraints, requiring patience, flexibility.*
- *Establish good communication channels with farmers.*
- *Actively involve farmers for insights and feedback.*
- *Be persistent 😊.*

Support and training

- *Provide guidance, explanations, training.*
- *Examples from practice speak more than hours of training.*



Field experience matters (a lot)

Developers, get your hands (and boots) dirty

- You must experience it to understand it.*

Test before deployment

- Test before deployment. Test before deployment. Test before deployment.*



Data is the new oil/gold/...treat it accordingly

Who owns data? What are you allowed to do with collected data?

- *Data ownership and usage agreements are needed.*

Collecting data from the field is not a simple task

- *Acknowledge the complexity and cost of data collection, including sensor selection and financial feasibility.*

Context does matter

- *Adequately describe data context to enable effective processing.*

Standards matter as well

- *Establish a common vocabulary for standardized data descriptions to ensure interoperability and scalability.*
- *Use AIM 😊*



Key lessons

- Collaborate closely with farmers
- Field experience matters (a lot)
- Data is the new oil/gold/...treat it accordingly

Digital farming portal: <https://digitalfarming.eu>



[Digital Farming Hub](#)

[AgChatBot](#)

[SOCS](#)

[DEMETER Framework](#)

[Enablers Marketplace](#)

[agroNET](#)

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A scenic photograph of a rural landscape with rolling green hills, a small village with white houses, and a large, bright green sun in the sky.

Empowering Agriculture: Welcome to the Digital Farming Hub

Your central destination for all things related to digital agriculture! Discover revolutionary digital tools, resources, and a community that will enhance your agricultural business.

Our platform brings together farmers, experts, and companies from this field to create a common space for exchanging ideas, knowledge, and partnerships.

Domain knowledge is powered by the DEMETER project.







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