

IOT IN AGRICULTURE

CASES IN AGRI-FOOD DEMONSTRATING IMPACT AND CHALLENGES

GEORGE BEERS, WAGENINGEN UNIVERSITY & RESEARCH
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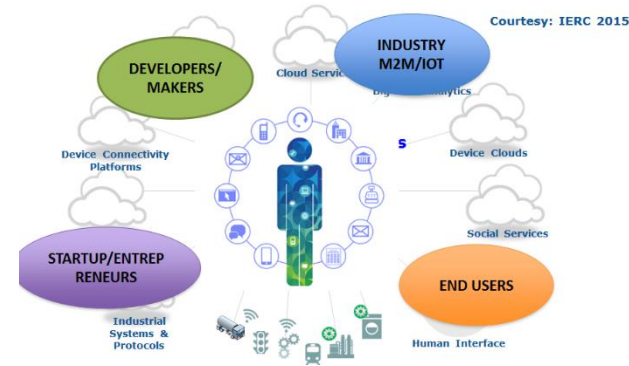


Euroopa Maaelu Arengu
Põllumajandusfond:
Euroopa investeringud
maapiirkondadesse



- Target
 - Link and align to **Strategy Digitising Europ. Industry DEI**
 - Fostering the take-up of IoT in Europe and enabling the emergence of **IoT ecosystems supported by open technologies and platforms.**

- The challenge
 - **Address business model validation & standardisation**
 - Address user validation and acceptability – **Ethics??**
 - Organisation of **open calls?**
 - Exploitation of **security & privacy** mechanisms?



European Public-Private ICT projects – Building the Ecosystem

2011-2013: **SmartAgriFood** – a FIWARE-based conceptual architecture and prototype applications (5 M€)



2013-2015: **FIspace** – B2B business collaboration platform for agri-food & logistics (+ apps) (13.5 M€)



2014-2016: **Accelerators**: SmartAgriFood2, FInish, FRACTALS (~17 M€) - 125 apps/start-ups based on FIWARE/FIspace



Sep. 2016: **FIWARE Foundation** established with 3 verticals: Smart Cities, Industry and **Agri-Food**



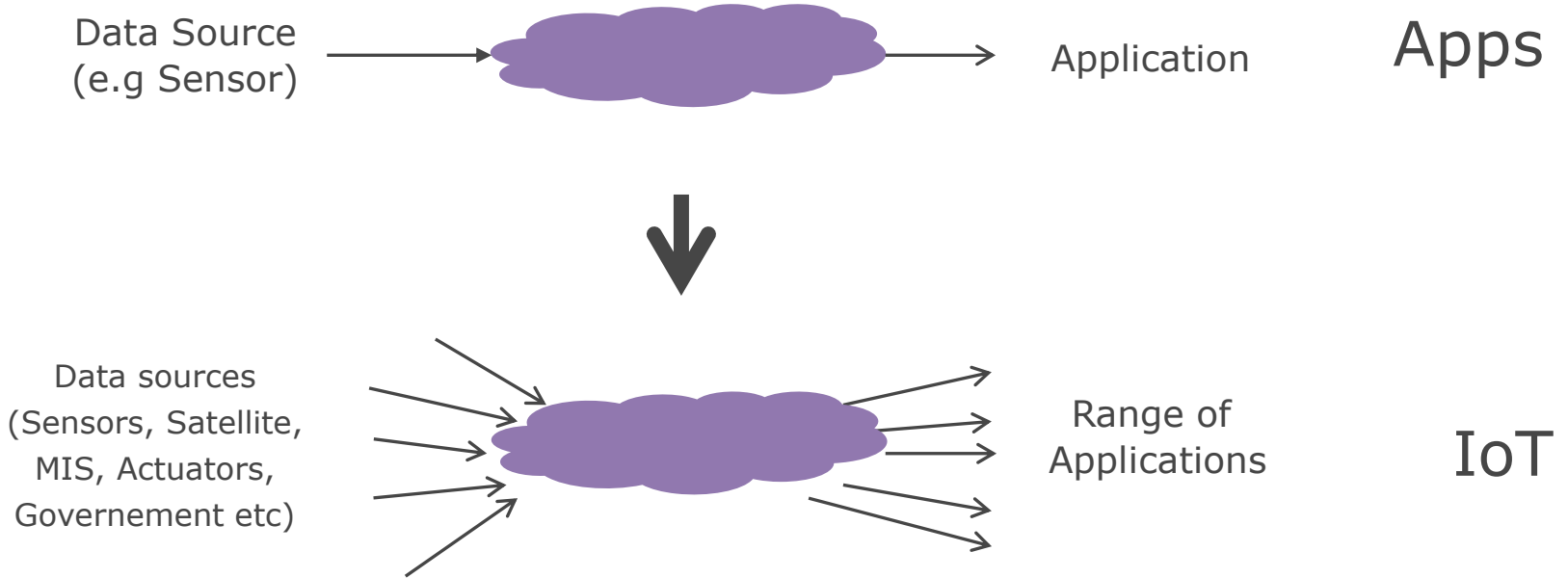
2017-2020: **IoF2020** – The Internet of Food and Farm (30 M€) - IoT large-scale pilot for smart farming and food security



2018-2022: **SmartAgriHubs** – Connecting the dots to unleash the innovation potential for digital transformation of the European Agri-Food sector (20 M€)



Cloud computing → IoT



No more apps → we need systems

OBJECTIVE

IoF2020 fosters a **large-scale uptake of IoT** in the European farming and food sector

- Demonstrate the **business case of IoT** for a large number of application areas in farming and food sector;
- **Integrate** and reuse available **IoT technologies** by exploiting open infrastructures and standards;
- Ensure **user acceptability of IoT** solutions in farming and food sector by addressing user needs, including security, privacy and trust issues;
- Ensure the **sustainability of IoT solutions** beyond the project by validating the related **business models** and setting up an **IoT ecosystem** for large scale uptake.



IOF2020 IN BRIEF



**71 PARTNERS
ORGANISATIONS**



**16
COUNTRIES**



4 YEARS
Start = January
2017



**€35 MILLION
BUDGET**
(€30 million co-funded
under EU H2020
programme)

OPEN CALL 'NEW INNOVATIVE IOT USE CASES'

Challenges

1. New regions

- Eastern and Northern Europe
- Re-use existing use cases

2. Post-farm and other sectors

- From farm → supply chain (logistics, processing, retail, consumption)
- Other crops, animals, etc.

Important Information

- Multi-actor use cases (no single-parties!)
- IoT value chain (tech providers, service integrators, end-users)
- Business/organizational aspects
- Total budget: 6 M€; per use case 300-500 k€
- Expected opening: June 2018
- See: www.iof2020.eu/opencall

IOF2020 IN FIGURES



**116 PARTNERS
ORGANISATIONS**



28 COUNTRIES



4 YEARS

Start = January 2017



€35 MILLION BUDGET

(€30 million co-funded under
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5 TRIALS, 33 USE CASES, 22 MS_s



ARABLE



FRUITS



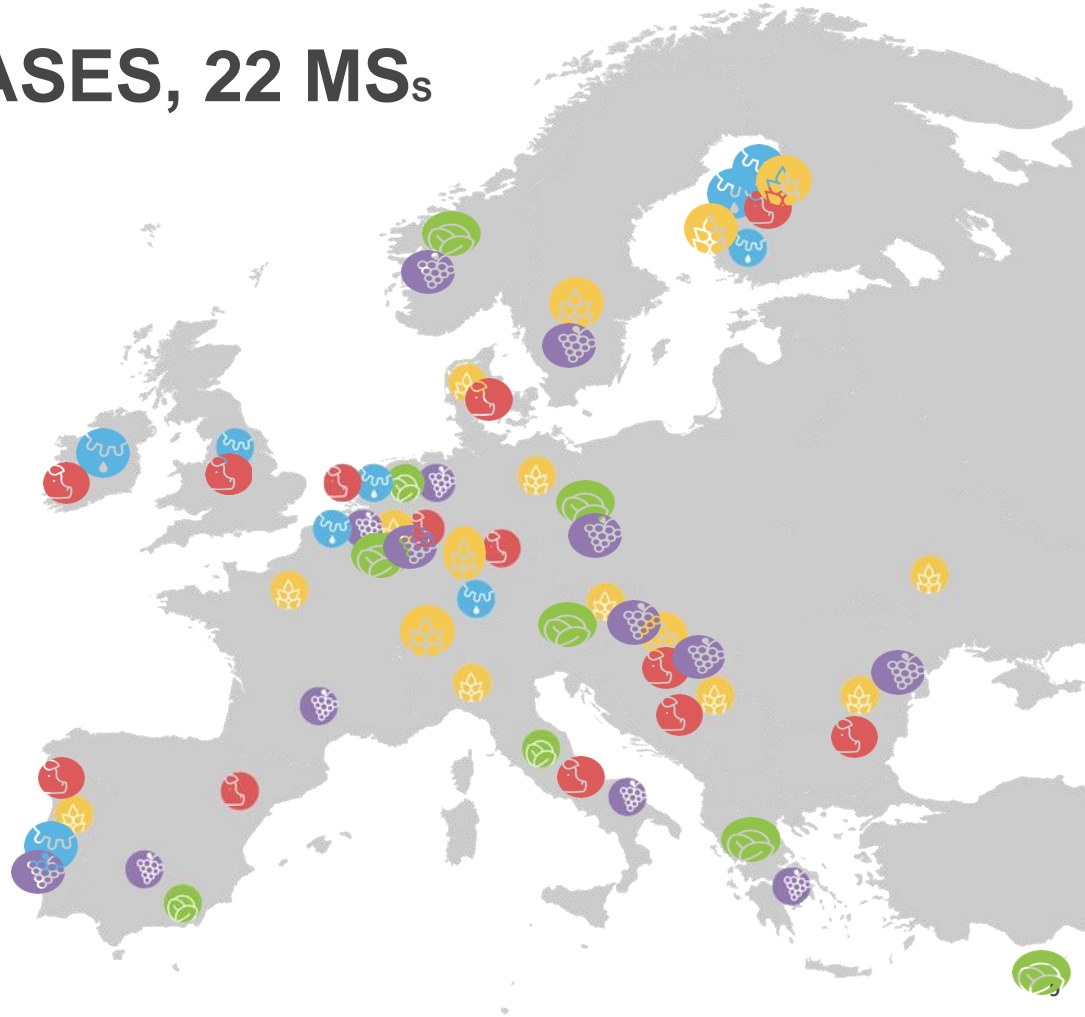
DAIRY



VEGETABLES



MEAT

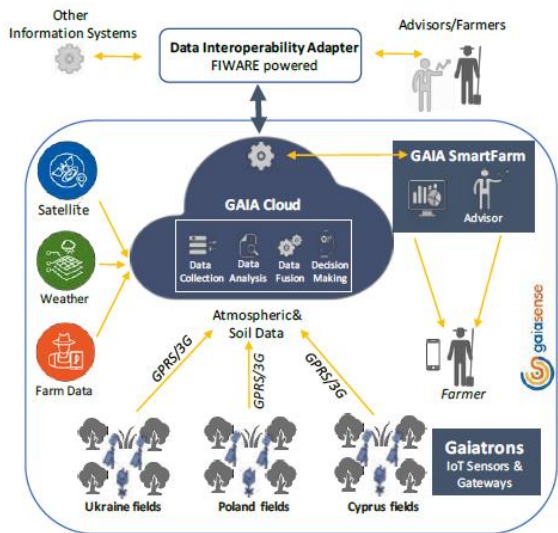




THE INTERNET OF ARABLE FARM

- **Within Field Management Zoning (potatoes)**
- **Precision Crop Management (wheat)**
- **Soya Protein Management**
- **Farm Machine Integration**
- **Solarvibes**
- **IoTrailer**
- **DaPope**
- **WFMZ**
- **IoT4Potato**

1.6 DATA-DRIVEN POTATO PRODUCTION



6/8 CURRENT TRL & TARGET TRL
- 25% WATER CONSUMPTION
- 19% TOTAL INPUT COSTS
- 15% PESTICIDE USE

- Data-driven potato prediction through the GAIA sense smart farming solution.
- Technologies: IoT, Big Data, Earth Observation, Context-based decision support, machine learning
- GAIA sense solution extended with FIWARE-powered, standards based, data exchange mechanisms in support of cross-system interoperability and openness.

OUR OBJECTIVES

- Demonstrate how the use of IoT-driven smart farming solutions can help reduce the environmental footprint of agriculture;
- Facilitating farmers' compliance with a wide range of European environmental legislation, including water and soil protection;
- Improvement of nitrogen use efficiency (+15%);
- Reduction of pesticides use (-15%);
- Reduction of water consumption (-25%).

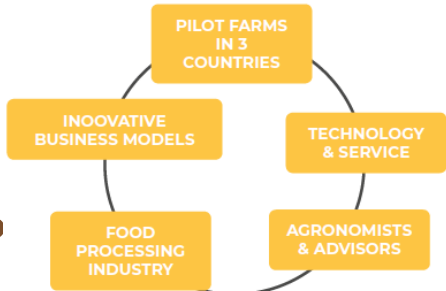
OTHER IMPACT

- Demonstrating the potential benefits derived from the use of IoT-driven solutions;
- Achieve sustainable economic growth and foster innovation;
- Reduction of inputs costs (-18,6%);
- Farmers benefited from the provided advice >500;
- Smart farming advice available up to 1500ha;
- Building on extensive business network in >50 countries.

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COUNTRIES





THE INTERNET OF DAIRY FARM

- Grazing Cow Monitor
- Happy Cow
- Silent Herdsman
- Remote Milk Quality
- Pitstop+
- MELD

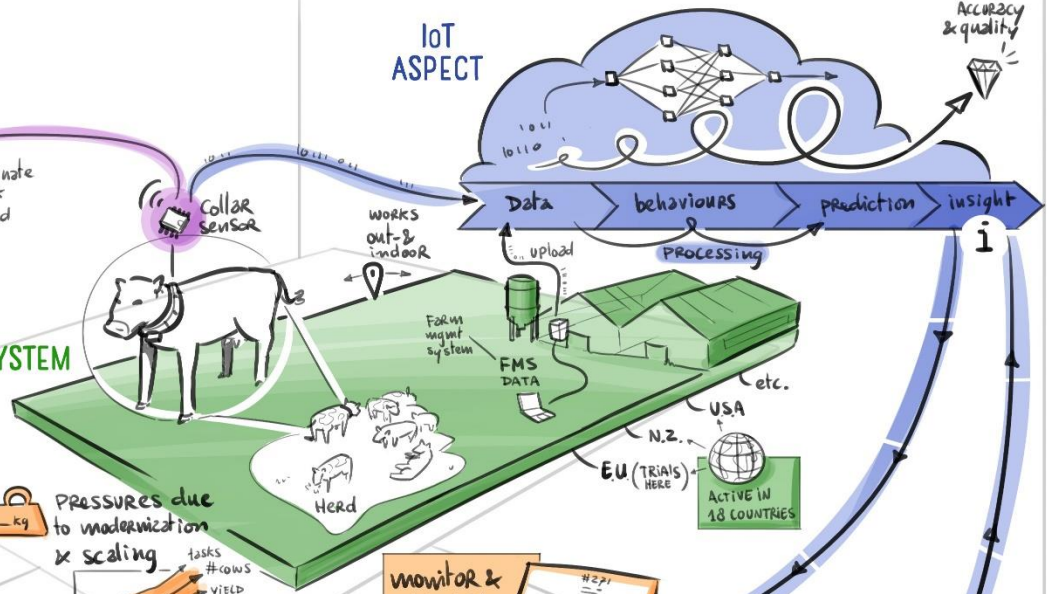
IDA: HAPPY COW!

SOLUTION

"From data to wellbeing"



IoT ASPECT



ECOSYSTEM

Pressures due to modernization & scaling

- tasks
- #cows
- yield etc.



DAIRY FARM OPERATIONS



Insight & predictions on cow health & fertility, from behaviour analysis

solution

Cow-generated data analysed for insights on behaviour (prediction)

ecosystem

Improved cow health & fertility, saving time/costs, increasing yield

customer value

Online platform using Machine Learning for data- & user feedback processing

IoT aspect

One subscription on digital insights

Subscription €/mo

revenue stream





THE INTERNET OF VEGETABLES

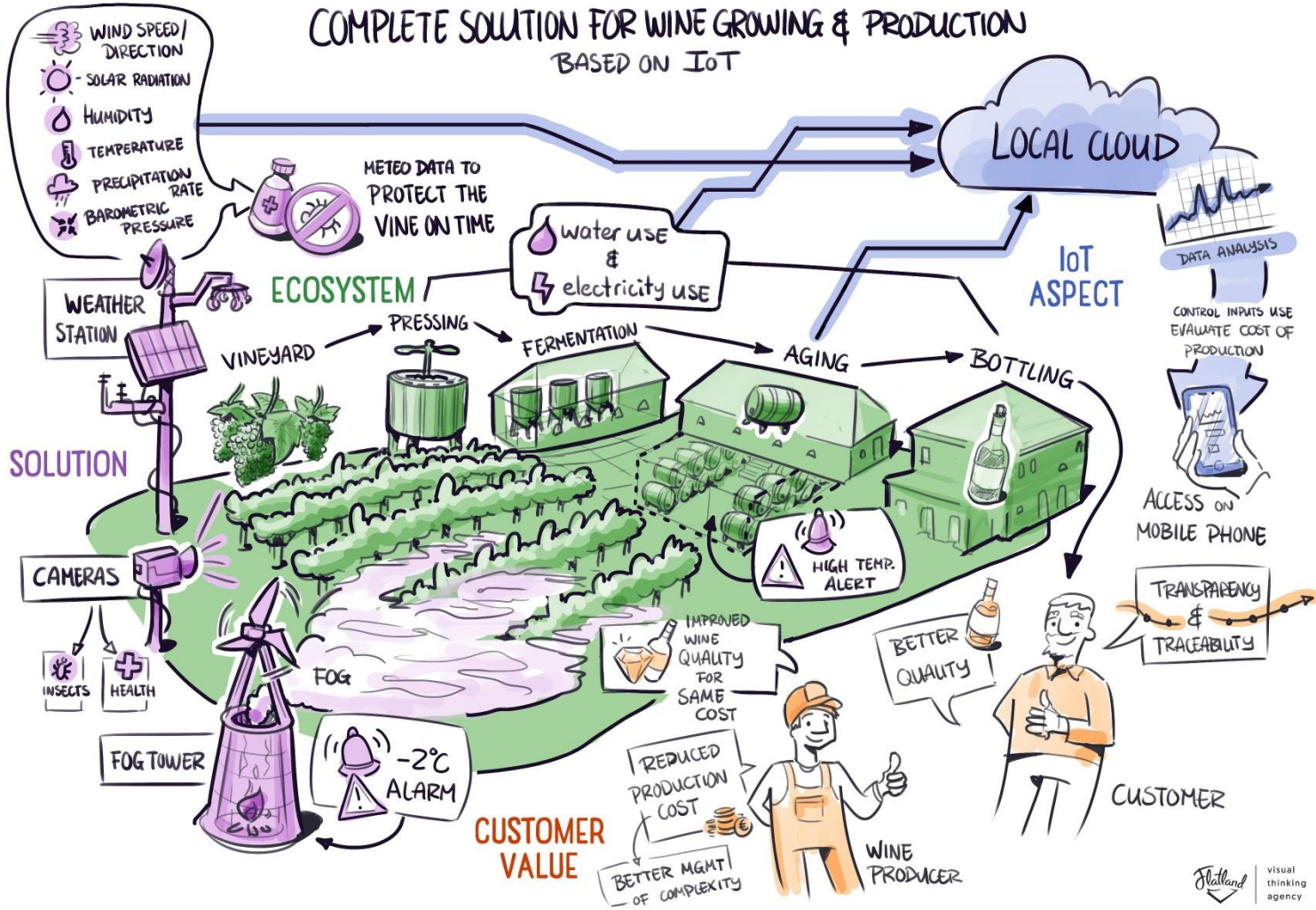
- City Farming Leafy Vegetables
 - Chain Integrated Greenhouse Production
 - Added Value Weeding Data
 - Enhanced Quality Certification
- Cysclops



THE INTERNET OF FRUIT

- Fresh Table Grapes Chain
- Big Wine Optimization
- Automated Olive Chain
- Intelligent Fruit Logistics
- Smartomizer
- BIT

COMPLETE SOLUTION FOR WINE GROWING & PRODUCTION BASED ON IOT

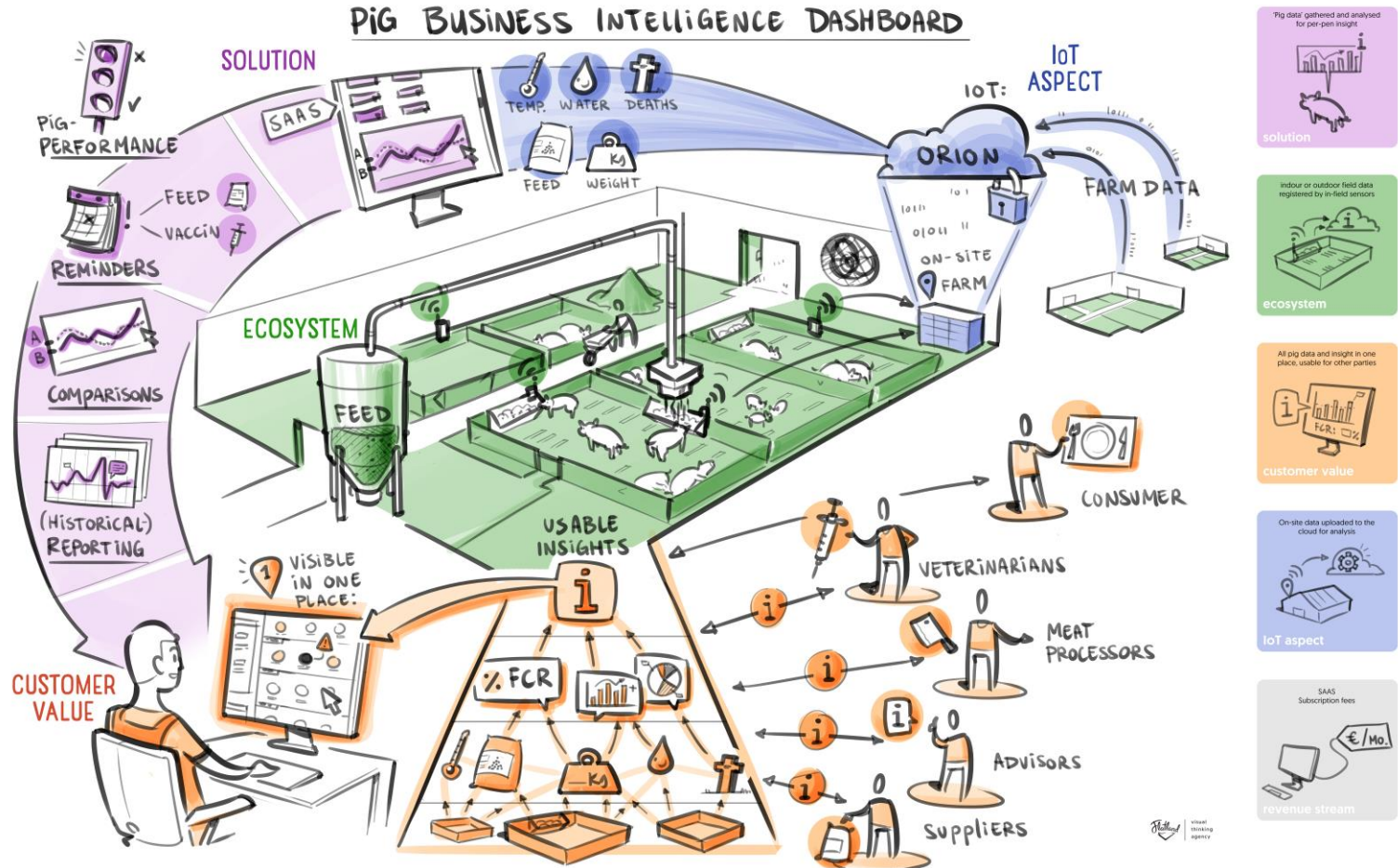




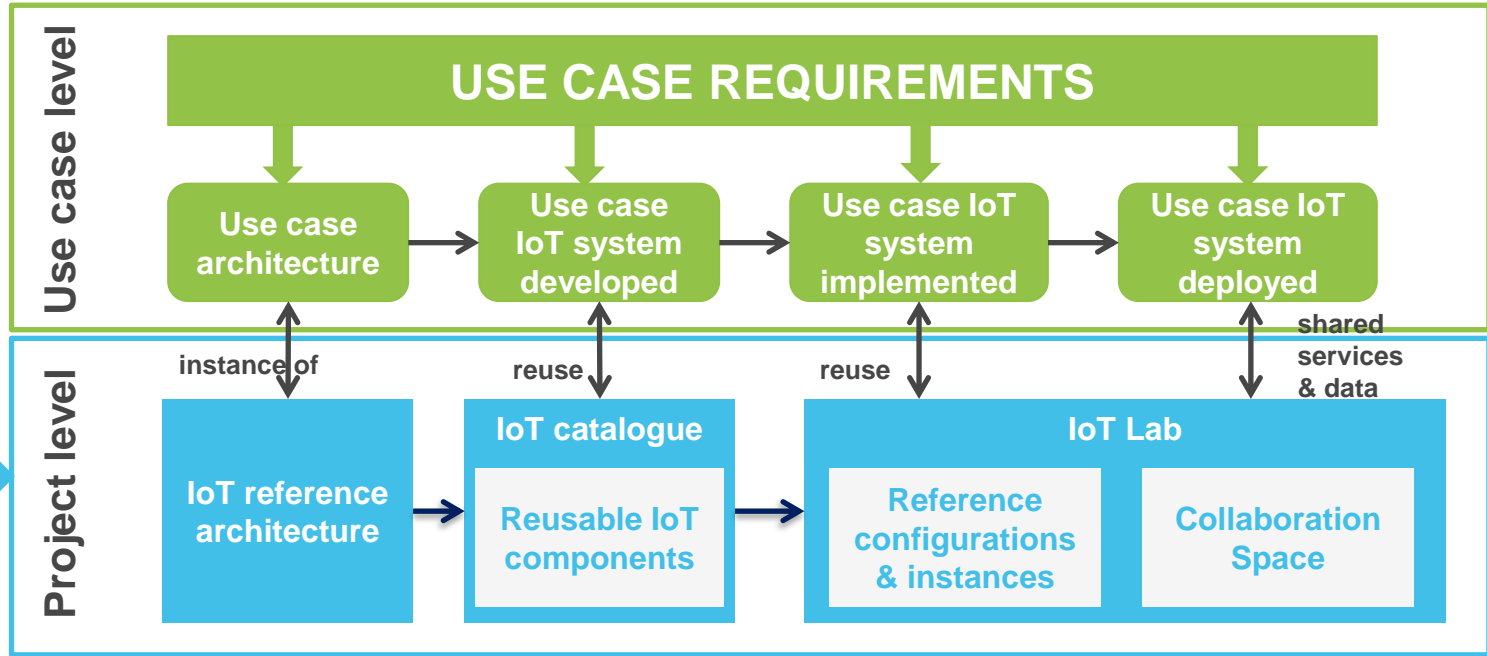
THE INTERNET OF MEAT

- Pig Farm Management
- Poultry Chain Management
- Meat Transparency and Traceability
- Sharebeef
- FitPig
- IoFeed

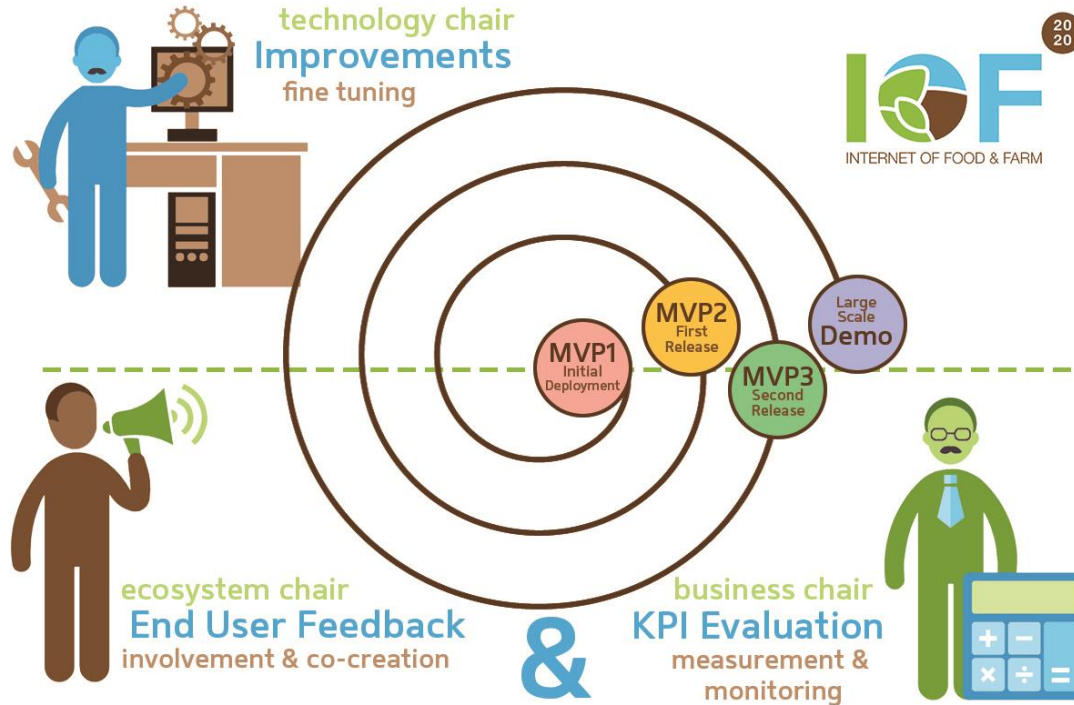
UC 5.1



TECHNICAL / ARCHITECTURAL APPROACH



Overall methodology



INNOVATION and KNOWLEDGE DEVELOPMENT – Technology Readiness Levels (TRL)

TRL9 – actual system proven in Operational environment

TRL8 – system complete and qualified

TRL7 – system prototype demonstration in operational environment

TRL6 – technology demonstrated in relevant environment

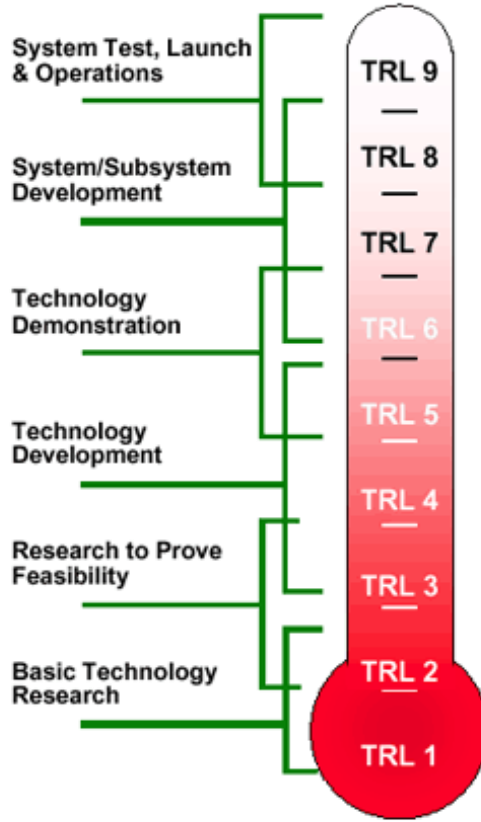
TRL5 – technology validated in relevant environment

TRL4 – technology validated in lab

TRL3 – experimental proof of concept

TRL2 – technology concept formulated

TRL1 – basic principles observed

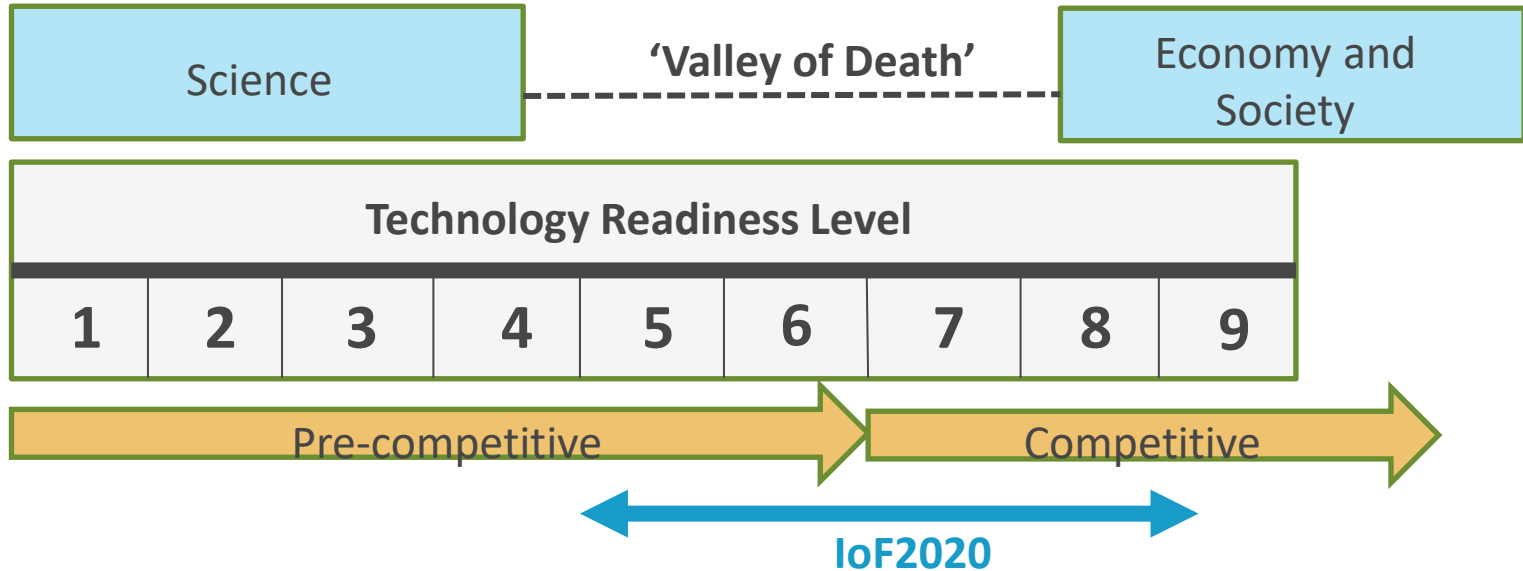


Education
Scaling-up
Training
Acceptance
Business models
Regulations
Validation
Co-Innovation
Applied Research

Examples of Knowledge processes



Innovation Action in the 'Twilight Zone'



Business support

KPI & IMPACT



Calculate costs savings and effects on revenue development & financing plans for farmers

BUSINESS MODELS



Different business models will be tested to identify the most successful and sustaining ones

MARKET STUDY



Buying and selling a product is the best service.

PRIVACY GUIDELINES



Develop standard procedures and guidelines to handle sensitive information and to protect IP

Additional activities:

- + network of test farms
- + building trust (ethics)
- + demonstration skills
- + distribution channels
- + access to funding

LESSONS LEARNED – MAIN CHALLENGES

- Standardization & Interoperability
- Re-Usability
- New Business models
- Trust (Ethics, Code of Conduct)
- Test and Demonstration
- Access to Funding
- Sustaining the results
- Replicability

DELIVERABLES IOF2020

- Sustainable business for Use Cases
 - Business model for IoT solution
 - Business for partners
- Collection Good Practices (Use Case Navigator)
- Catalogue Re-Usable components
- Toolkit for UC support (technology, business, ecosystem, ethics)
- Policy Recommendations
- Ecosystem → SmartAgriHubs

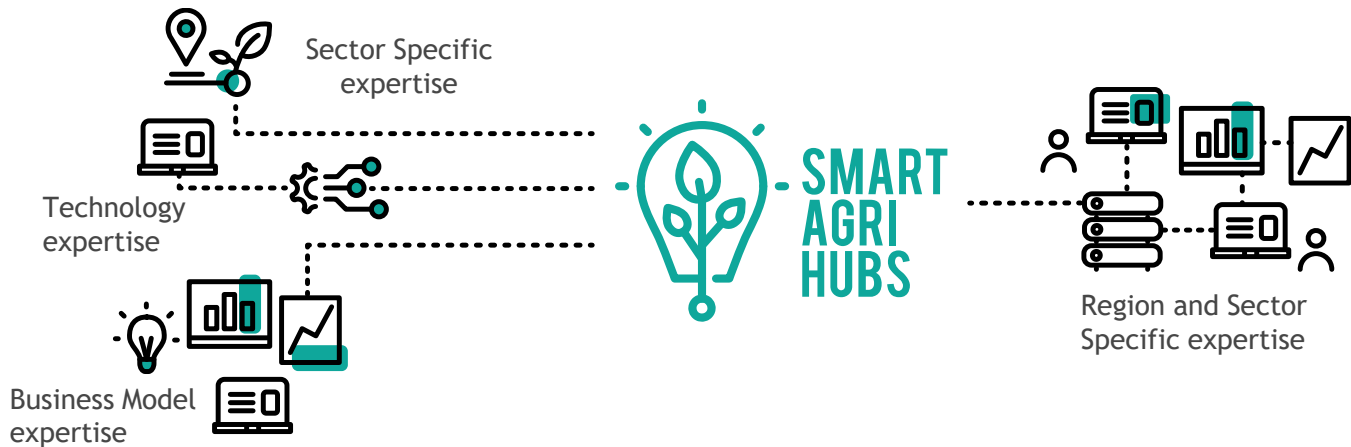
SCALING UP AND ROLLING OUT

- Dissemination – outreach IoF results in regions
 - Shared Ecosystem (for piloting-testing-demonstration-dissemination)
 - Toolkit for support → DIH Services
 - Re-Usable components → Innovation Experiments
 - Good practices → Inspiration for DIH initiatives
- Exposure in the Pan-European network !!

Consolidate and foster EU-wide network of Ag DIHs to enhance digital transformation for sustainable farming and food production

“CONNECTING THE DOTS”

State of the Art
EU level



Digital Innovation
Local level



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THANK YOU FOR
YOUR ATTENTION!

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Please find more information on
www.smartagrihubs.eu



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