WHAT LIES AHEAD IN THE AGRIFOOD SECTOR?

IOT Week

IOT DEPLOYMENT & BUSINESS CHALLENGES
JOIN THE DISCUSSION

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GRIGORIS CHATZIKOSTAS

Use-case Lead at IoF2020
Head of Business Development at BioSense Institute
HARALD SUNDMAEKER
Technology Lead of IoF2020
Senior Researcher at ATB Bremen
CLAUS GRØN SØRENSEN
Co-Lead of IoF2020 Use-case on Interoperability
Head of Research Unit at Aarhus University
KLAUS-HERBERT ROLF
Communication partner at 365FarmNet
Network Manager bei CLAAS KGaA
GRIGORIS CHATZIKOSTAS

Use-case Lead at IoF2020
Head of Business Development at BioSense Institute
VISION OF THE POTENTIAL DISRUPTIVE IMPACT OF IoT SOLUTIONS ON THE AGRI-FOOD SECTOR

IoT deployment and business challenges for the Agri-Food sector

GRIGORIS CHATZIKOSTAS
June 19, 2019
A VISION OF THE AGRI-FOOD SECTOR IN 2050 THROUGHOUT THE FULL VALUE CHAIN
The Digital Transformation of Agri-Food

Public decision-making

- Food Safety
- Environment
- Nutrition
- Climate
- Health
- Food Security

Corporate Decision-Making

- Blockchain Technology
- Smart Sensing & Monitoring
- Smart Analysis & Planning
- Artificial Intelligence

Science & Technology

- Blockchain Technology
- Linked Data
- Big Data Analytics
- Smart Control

Food Integrity

- Cloud Computing
- Internet of Things

Image source: SmartAgriHubs - Connecting the dots to unleash the innovation potential for digital transformation of the European agri-food sector, presentation of Sjaak Wolfert, SmartAgriHubs kick-off meeting, March 2019
IoF2020 SOLUTIONS AND THEIR CURRENT POSITION IN THE DEVELOPMENT CYCLE
IoT SOLUTIONS FOR ARABLE FARMING

- **Electrical conductivity scanner** detecting clay content and organic matter for conductivity zoning
- **Akkerweb platform dashboard** for soil mapping
- Arable farming has 44 deployment sites
- Interoperability between farm machines and software is bridged

Crop monitoring dashboard

Akkerweb platform dashboard for soil mapping
IoT SOLUTIONS FOR DAIRY FARMING

- IoT for remote calibration support of milk samples to guarantee milk safety and quality
  - Connecterra raised additional €4.2m for dairy tech
  - Dairy farming has 30 deployment sites around Europe

Radio and TV feature of artificial intelligence in dairy farming

Outdoor beef cattle tracking has rescued a trapped cow in a nature reserve area
IoT SOLUTIONS FOR FRUIT

- Fruit Trial has more than 50 deployment sites around Europe
- Wine shipping device (Jodyn Live) test extension to USA & China
- Strong Fruit Trial synergies and collaboration
- EuroPool performs large-scale experimentation in real supply chains
IoT SOLUTIONS FOR VEGETABLES

Sensors located in a growth layer in one of the climate cells at Signify

- Vegetables Trial has 29 deployment sites around Europe
- Full-controlled farming is operating under regulated conditions
- New crops introduced for weeding machines testing
IoT SOLUTIONS FOR MEAT

Alerts when the feed intake has dropped under the threshold

- Managed to optimize production, transport & processing of poultry meat
- IK4-TEKNIKER has launched novel transport sensor
- Meat Trial has more than 20 deployment sites
IoF2020 DEPLOYMENT SITES OVERVIEW
5 TRIALS - 33 USE CASES

- ARABLE
- FRUITS
- DAIRY
- VEGETABLES
- MEAT
BREAKS AND ACCELERATORS FOR DEVELOPMENT
ACCELERATORS

• Increased awareness for food safety & transparency
• Ease of use and affordability, value-for-money, ROI, novel business models
• Vertical and horizontal integration across value chains, fear-of-missing-out
• Traction with investors

BREAKS

• Interoperability challenges
• Perceived security and privacy risks
• Data ownership issues
• Barriers on global trade of agri-food products
• Rural wireless and broadband coverage
NEXT STEPS

- Exploitation & monetization,
- Actively engaging with end-users,
- Scaling up,
- Global expansion.
THANK YOU

Any questions?

Grigoris Chatzikostas
chatzikostas@biosense.rs
HARALD SUNDMAEKER
Technology Lead of IoF2020
Senior Researcher at ATB Bremen
Technical Challenges of IoT Deployment in the Agri-food Sector

IoT Week 2019

IoT Deployment and Business Challenges for the Agri-Food sector: What lies ahead?

Aarhus, 19.06.2019 – Harald Sundmaeker – ATB, IoF2020 Large Scale Pilot Project
IoF2020 – What does it mean?
IoF2020 – what does it mean?

• Diverse agri-food sectors addressed for IoT validation
• Heterogeneity of IoT based solutions
• From large industry to small farmers
• From small scale experimentation to large scale deployment
• Complexity!
<table>
<thead>
<tr>
<th>Use Case ID</th>
<th>Description</th>
<th>Country/Region(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC1.1</td>
<td>Within-field Management Zoning</td>
<td>NL, DE, BE, FR, UK, PL</td>
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<tr>
<td>UC1.2</td>
<td>Precision Crop Management</td>
<td>FR</td>
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<tr>
<td>UC1.3</td>
<td>Soya Protein Management</td>
<td>AT, IT</td>
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<tr>
<td>UC1.4</td>
<td>Farm Machine Interoperability</td>
<td>NL, DE, DK, BE, FR, AT, RS, RO, UA, IT</td>
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<td>UC1.5</td>
<td>Potato Data Processing Exchange</td>
<td>NL, BE, PL</td>
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<tr>
<td>UC1.6</td>
<td>Data-Driven Potato Production</td>
<td>CY, PL, UA, EL</td>
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<tr>
<td>UC1.7</td>
<td>Traceability for Food and Feed Logistics</td>
<td>BE, NL, PL, FR, BG, RO, ES, SI</td>
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<tr>
<td>UC1.8</td>
<td>Solar-powered Field Sensors</td>
<td>DE, RO, HU</td>
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<tr>
<td>UC1.9</td>
<td>Within-field Management Zone Baltics</td>
<td>LT, LV, NL</td>
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<td>UC1.10</td>
<td>Cow Grazing Monitor</td>
<td>BE, NL</td>
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<tr>
<td>UC1.11</td>
<td>Happy Cow</td>
<td>NL, BE, DE, IE</td>
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<td>UC1.12</td>
<td>Silo Management</td>
<td>LT, LV, NL</td>
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<td>UC1.13</td>
<td>Potatoes Data Processing Exchange</td>
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<td>UC1.14</td>
<td>Smart precision potato production</td>
<td>CY, PL, UA, EL</td>
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<td>UC1.15</td>
<td>Secure transport of bulk goods</td>
<td>BE, NL, PL, FR, BG, RO, ES, SI</td>
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<td>UC2.1</td>
<td>Lameness Detection through Machine Learning</td>
<td>DK, LT, LV, DE</td>
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<tr>
<td>UC2.2</td>
<td>Early lameness detection in cattle</td>
<td>HU, PL, CZ, SK</td>
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<tr>
<td>UC2.3</td>
<td>Smart precision cow and cattle monitoring</td>
<td>IT, EL</td>
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<tr>
<td>UC2.4</td>
<td>Remote sensor calibration for dairy labs</td>
<td>NL</td>
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<td>UC2.5</td>
<td>Enhanced Quality Certification System</td>
<td>ES, HU, PL, PT</td>
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<td>UC2.6</td>
<td>Digital ecosystem utilization</td>
<td>IT, PT, RO</td>
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<tr>
<td>UC2.7</td>
<td>Optimize plant protection spraying</td>
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<td>UC2.8</td>
<td>Full automated vertical farming</td>
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<td>UC2.9</td>
<td>Animal welfare monitoring</td>
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<td>UC3.1</td>
<td>Automated Olive Chain</td>
<td>ES, EL</td>
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<td>UC3.2</td>
<td>Smart sensing in whole logistic chain</td>
<td>DE, NL</td>
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<tr>
<td>UC3.3</td>
<td>Smart Orchard Spray Application</td>
<td>IT, PT, RO</td>
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<td>UC3.4</td>
<td>Optimize plant protection spraying</td>
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<td>Sensing as data sources for certification</td>
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<tr>
<td>UC3.7</td>
<td>Sensing as data sources for certification</td>
<td>SE, ES, CH</td>
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<tr>
<td>UC3.8</td>
<td>Data exchange across value chain</td>
<td>BG, HR, IE, IT, ES, PT</td>
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<tr>
<td>UC3.9</td>
<td>Edge-computed plant sensing on video</td>
<td>IT, ES</td>
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<td>UC4.1</td>
<td>Pig Farm Management</td>
<td>BE, NL</td>
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<tr>
<td>UC4.2</td>
<td>Poultry Chain Management</td>
<td>ES, BE</td>
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<td>UC4.3</td>
<td>Decision Making Optimization in Beef Supply</td>
<td>BG, HR, IE, IT, ES, PT</td>
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<tr>
<td>UC4.4</td>
<td>Enhanced Quality Certification System</td>
<td>ES, UK, DE</td>
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<td>UC4.5</td>
<td>Digital Ecosystem Utilization</td>
<td>SE, ES, CH</td>
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<tr>
<td>UC4.6</td>
<td>Measured performance</td>
<td>BG, HR, IE, IT, ES, PT</td>
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<td>UC4.7</td>
<td>Animal performance</td>
<td>SE, ES, CH</td>
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</table>

**IoF2020 use-cases**

Here is an overview of the use-cases.
Structure for UC Analysis

- Aiming to understand the degree of reusability, outside the use case scope.
- Are there potential synergies between use cases?
Type of Results vs. Realistic Possibility for Reuse!? 

- COTS components
- Implemented MVPs
- Integrated Solution
- Enhanced COTS Solutions
- Extended Services
- Additional reusable Components

Overall IoT-based Solution realised and validated in an IoF2020 Use Case
Smart Farm Management Systems: an open approach

- FIWARE Orion Context Broker technology as open, neutral and standard-based data integration technology
  - Easy integration in architecture of Farm Management systems
  - “only once” integration of farm vertical solutions

- Common Information Models easing interoperability and replaceability of solutions:
  - Farm Management systems
  - Vertical solutions

- Integration with data publication and marketplace platforms based on open standards
Key Technical Challenges for IoT Deployment

- Interoperability and granting/limiting access to data
- Costs vs. quality
- Accuracy of sensors & Battery lifetime
- Availability of communication networks
- Communication bandwidth
- Size of components
- Harsh environment (e.g. impact of vibration, humidity, temperature)
Reusable components relevant in the IoF2020 use cases
This diagram represents all the actual relations that IoT Catalogue currently has. The proportion of the bubble represents the number of relationships that every element have.
Sustainable IoT Catalogue presenting components & lessons learnt that facilitate realisation of IoT based solutions

www.iot-catalogue.com
Different ways to access information

- Listing the IoF2020 use cases
- Enabling search by components
- Mapping of solutions with value propositions, ICT problems, functions and target scenario
- Identifying the team behind

www.iot-catalogue.com
Let’s also discuss detailed questions directly

Harald Sundmaeker
WP3 Leader
Sundmaeker@atb-bremen.de
+49 421 2209253

ATB Institute for Applied Systems
Technology Bremen GmbH
Wiener Str. 1
D-28359 Bremen

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CLAUS GRØN SØRENSEN
Co-Lead of IoF2020 Use-case on Interoperability
Head of Research Unit at Aarhus University
THE IMPLICATIONS OF IOT FOR THE AGRICULTURAL MACHINERY SECTOR

CLAUS GRØN SØRENSEN
MICHAEL NØRREMATT
AARHUS UNIVERSITY
June 19, 2019
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement №731884
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement №731884.
Popular business models

- Preventive maint.
- Product innovation
- …

Business ecosystem for machinery manufacturers widen

Transferring from machines to operations services

Selling DSS services (operations and production management, environment, efficiency)

Farmer

Machinery sector

Third party, decision support/APP development

Aggregated data usage across farms

Data exchange:
- IoT platforms/cloud
- Standards (ex ADAPT)
- …
Vision business models and ecosystems!

- Farmer
- Machinery sector

Data exchange:
- IoT platforms/cloud
- Standards (ex ADAPT)
- ...

Selling DSS services
(selling operations and production management, environment, efficiency)

CNH/AGCO .. as software providers

Monetize data value?

Third party, decision support/APP development

Aggregated data usage across farms

Selling data

- Preventive maint.
- Product innovation
- ....
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement №731884.
New prospective benefits/business models

• collect data and measurement about the production -> **agronomic input for management and promoting sustainability**

• connecting agricultural data with their manufacturers -> **predictive maintenance, guarantee claims**.

• smart farming technologies will pave the way for **autonomous systems** (robots, self awareness, supportive IT systems, etc.)

• basic data sales - on-farm tests, product innovation, etc.

• vehicle data sent on-line valuable both for the vehicle value chain (dealers, insurance, complaint issues, etc.) and for external actors

• ”Power/functionalties on demand” - on-line via apps and factory or dealer updates
Key takeaway points

• Extending from electro/mechanics to ICT/IoT
• Extending from product focus to IoT platform business/services
• Change of company culture/mindset
• Technical challenges/connectivity
• Current workforce re-education/re-training
• Privacy/security
• Monetarization of data value/data ownership
• Multi-branded fleets/cross-domain scenarios
• Damage to the brand from IoT system failures
• Initial business failure due to initial small data samples
KLAUS-HERBERT ROLF
Communication partner at 365FarmNet
Network Manager bei CLAAS KGaA
IoT Deployment and Business Challenges for the Agri-Food sector

- what lies ahead?

Klaus-Herbert Rolf
Digital Development and Future Trends

- Decision support
- Technology Trigger
- M2M
- Farm IoT
- Peak of Inflated Expectation
- Smart Data
- Lifestock Farming
- Smart Farming
- Traceability Platforms
- Precision Farming
- Big Data
- ISOBUS Standards
- Partner Concepts
- AG Platforms
- Satellite Images
- Cloud
- VAR
- Soil sampling
- In Cab Display
- Auto steering
- Milking roboter
- Yield monitoring

Source: Gartner & 365FarmNet
Technical challenge – Limitations
Social challenges – Transparency
365 days a year from anywhere

- Automated documentation
- Data entry and information by mobile device
- Cross Compliance
- Visualizing evaluations
Data entry and information by mobile device – > 365FarmNet always at hand

365Crop App

365Cattle App

365Active App
Visualizing evaluations –
> Change the perspective
Visualizing evaluations –
> Sensors – Reduce and optimize the input
Component: Field optimization
Result of a machine with a working width of 15 Meters

Digital values for barn and field
Partnership concept

365FarmNet

Machines  Equipment  Prognoses  Consulting  Sensors  Analysis

Digital values for barn and field
Conclusion and future prospects
The challenge of the future: more intelligence on the m2
Digital values for barn and field

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PANEL DISCUSSION

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THANK YOU!