D3.2. Smart AKIS Regional Report

German Innovation Hub

smartAKIS
Smart Farming Thematic Network

Document Summary

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Abstract

In work package 3 the German Hug organized 3 Regional Innovation Workshops in Saxony Anhalt (mid-eas arable region), Bavaria (southern mixed-farming region) and in Saxony. The program followed the line of problems defined in Task 2.2 followed by the presentation of potential solutions and further on discussing the options with stakeholders in the branch to redefine and break down specific requirements when using the SFTs in practical farming.
Farmers, consultants, politics and industry representatives used the workshops to defence barriers of adoption as well as potential political instruments to overcome those barriers.

Table of Contents

1. Executive Summary 4
2. Innovation Process 6
3. Findings 10
   - 3.1. Identification of barriers and incentives for adoption of SFTs 10
   - 3.2. Interest on existing SFTs – most demanded SFTs 11
   - 3.3. Research needs in Smart Farming 11
   - 3.4. Other relevant findings 12
   - 3.5. Potential collaborations identified 12
4. Recommendations 12
   - 4.1. Sustainability and mainstreaming of Smart-AKIS results 12
   - 4.2. Adoption of Smart Farming Technologies 12
   - 4.3. Strengthening Innovation in Agriculture 12
   - 4.4. Smart Farming R&D agenda 13
5. Annexes 13
   - 5.1. Minutes of the Regional Innovation Workshops 13
     - 5.1.1. RIW1 13
     - Programme 13
     - RIW1 Power Point presentations 14
     - RIW1 Attendance Sheets 26
     - RIW1 Pictures 26
     - RIW1 Findings 28
     - RIW1 Project Ideas 34
     - RIW1 Evaluation 34
     - 5.1.2. RIW2 36
     - RIW2 Programme 36
     - RIW2 Presentations 37
     - RIW2 Attendance Sheets 43
     - RIW2 Pictures 44
     - RIW2 Findings 49
     - RIW2 Evaluation 54
     - 5.1.3. RIW3 61
     - RIW3 Program 61
     - RIW3 Presentations 62
     - RIW3 Attendance Sheets 65
     - RIW3 Pictures 65
     - RIW3 Findings 66
     - RIW3 Project Ideas 66
   - 5.2. Research needs in Smart Farming 68
   - 5.3. Project ideas Research needs in Smart Farming 76
   - 5.4. Project ideas from workshops 77

1. Executive Summary

- Description of the partners involved in the process at regional innovation hub level.

The Regional Innovation Workshops were led by DLG, German Agricultural Society, and strongly supported by ZALF and its team. The RIW2 in October 2017 was strongly supported by the Regional Office for Agriculture of the federal state of Bavaria (LfL).. The LfL is located in Bavaria and therefore has a unique network to farmers in small structured regions. This enabled us, to invite farmers working in structures similar to many regions in Europe. This was decided after the RIW1 resulted in interest of mainly large farm structures. The question arose, which SFTs could also support smaller farming systems to maintain sustainable farming in Germany.
The two German Hub partners, DLG and ZALF, worked together to have successful workshops in Germany focusing on step by step concentrating on specific topics, barriers and innovations.
In Germany the use of GPS tracking systems for guidance of tractors and machines is the most widely used SFT. Especially in arable farming the use of maps (soil, canopy, fertilizer) are common tools. Those maps are developed out of drone or satellite data. As well, soil sensors and regular point-analysis are used to derive soil maps for improved crop management. Additionally, most farmers also use Apps especially for weather forecast and market observation. All farmers are interested in using autonomous machines or robots if there would be adequate developments and regularities for save use of this technology. The more important cash crops (fruits, vegetables) are within a farm, the more relevant forecast models for pest infections become.
It was agreed about the main impact areas of plant protection and nutrient management (strongly connected to soil protection) as well as data management in German arable farming. Many farmers are already using steering systems or electronic field catalogues as well as apps (e.g. weather forecast) which seem to be the doorways for further adoption of SFTs in agriculture. Having those tools, further electronic systems may be connected and integrated into the productions system. In fertilizer management, the tool for sensing the actual nutrient status of a crop canopy (YARA, Fritzmeier, FarmFacts) is one promising solution to improve nutrient supply. Combined with a tool of predicting future nutrient demand (YARA, FarmFacts) a whole system is provided for optimal nutrient management. As organic fertilizing with slurry or manure gets more restricted and less manageable with the new ordinance, the sensor, measuring manure nutrient contents online during application (Fliegl) is a desired solution for crop production. Out of that, knowledge of nutrient amounts applied on a field could be collected and documented for further decision making.
In crop protection, app-based systems to identify pests and recommendation for treatment (BASF) are new ideas in threshold- and target-oriented crop protection. The second step after identifying pests is an optimized application system. Improved boom control and nozzle triggering (KUHN) may help to reduce drift and environmental impacts in the field.
Finally, and for all systems very interesting, new sensor developments (Fraunhofer Institute) could improve climate, soil, and plant observation for an improved crop management. Biodegradable micro-sensors with costs of only few Euro-Cents promise an economic and broad monitoring of field characteristics and dynamics to better understand interactions and, eventually, an improved crop management.
DLG network was used to engage target groups such as farmers, consultants, representatives out of politics and industry. The DLG weekly newsletter and contacts of Agritechnica were used to invite farmers. To especially invite engaged people who include themselves in discussions and innovative working groups personal contacts were used. Therefore, a number of people were called personally to ensure suitable and engaged participants.

The main findings of the RIWs are that SFTs are not yet well adopted in practical farming due to four main barriers:

1. missing standards; There is not yet a standardization of interfaces for rapid and secure exchange of data between different systems. Most providers use their individual data format or interface so an easy exchange is not yet given.

2. hardware development; hardware developments do hardly meet the innovative speed of software solutions. Software, data analysis and information supply is already ahead of the translation in machinery steering (seed densities, tilling technology).
3. mobile/digital infrastructure; There is not yet sufficient infrastructure given for exchange and transport of big amount of data. Especially in rural areas of eastern Germany mobile or wire infrastructure does not meet the needs for SFTs in agriculture.
4. communication; the communication of advantages for the farmer is not yet done sufficiently. Additionally, the decision for farmers is hard as a typical investment period in farm machinery is about 10 years which does not match with rapidly changing adaption of machines to new smart tools. A number of farmers cannot reproduce the advantages in using SFTs, especially when the costs of SFTs exceed the direct visible benefit.

- Summary of main recommendations.

Farmers in Germany are already using SFTs in crop management. Some of those SFTs are already widely adopted and proved to improve crop management. At the same time farmers and consultants agree that there is a huge number of SFTs available, however, they did not yet prove their benefits in practical farming. Missing interfaces, questionable after sale services, discussions of data ownerships as well as high costs and missing infrastructure avoid broad adoption of SFTs in practical farming.

Dates and attendance of target groups to the three Regional Innovation Workshops:

Regional Innovation Workshops	Place and date	Nº of participants (and type)
1st RIW	DLG International Crop Production Center, Bernburg, 30. May 2017	66 participants in total Researchers: 17 Industry: 24 Farmers: 13 Consultants: 12
2nd RIW	LfL Research Station Grub, Poing, 24. October 2017	Total: 67 Researchers: 28 Industry: 19 Farmers: 15 Consultants: 5
3rd RIW	Leipzig, 6. March 2018	9 participants in total Researcher: 4 Start-Up: 2 Consultant: 1 Funding: 2

Summary of the results of the Regional Innovation Workshops, following this table:

KPI	Result
Nº of stakeholders participating in RIWs	142
Nº of SFT solutions presented in RIWs	12
Nº of SFT solutions adopted by practitioners	9
Nº of project ideas captured	1
Nº of INNOVATION project ideas	*1*
Nº of TECHNOLOGY TRANSFER project ideas	-
Nº of MARKET UPTAKE project ideas	-
Nº of multi-actor projects funded	-
Nº of multi-actor cross-border projects started	-

There were many discussions on project ideas during lobby talks. Companies and institutions avoid talking about innovative ideas in public to prevent competition. It cannot be expected that especially entrepreneurs (farmers, providers, developers) discuss product ideas openly having competitors in the same room.

2. Innovation Process

Communication Strategy

- To avoid having unproductive participants (no inclusion into discussions, copying new ideas, …) most participants were contacted personally via phone or email. Therefore, there was no official call for the RIWs. Due to the number of participants, this procedure proved to be well working. The workshop method was chosen to have every participant interactively joining the discussion.
  Following this strategy, we ensured a) a sufficient number of participants and b) fruitful discussions with all relevant stakeholders in the branch.
  Especially in RIW2 DLG benefitted from the partnership with the LfL who used its individual network to break down the circle of participants to the special target group chosen.

- Calendar of RIWs and number of participants.

Regional Innovation Workshops	Place and date	Nº of participants per group: users (farmers, coops and agrifood industry), SFT industry, research, advisors & others (policy, etc.)
1st RIW	DLG International Crop Production Center, Bernburg, 30. May 2017	66 participants in total Researchers: 17 Industry: 24 Farmers: 13 Consultants: 12
2nd RIW	LfL Research Station Grub, Poing, 24. October 2017	Total: 67 Researchers: 28 Industry: 19 Farmers: 15 Consultants: 5
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Target Groups needs and expectations

- Findings from regional farmers' needs surveyed in Task2.2 that have been taken into consideration for:
  - The selection of the SFTs to be showcased in the RIWs.
    The range of used SFTs questioned in Task 2.2 was used to identify relevant SFTs for the RIWs with
    a) fertilizer sensors
    b) plant protection technology
    c) data management
    d) farm management systems
  - The definition of the target groups to address on RIWs.

Most relevant for the RIWs of course were farmers to identify their needs. As well, companies were included to present their developments in innovative technology. Consultants and policy representatives are an important group to disseminate new findings into regulatory administration and practical farming, respectively. Finally, researchers were invited to bring in new ideas and methods for identified gaps in development.

- The definition of the programme or agenda of RIWs.
  The program followed the line of highlighting the problems defined in Task 2.2 followed by the presentation of potential solutions and further on discussing the options with stakeholders in the branch to redefine and break down specific requirements when using the SFTs in practical farming. From RIW1 to RIW3:
  i) presenting the needs out of Task 2.2 and get in confirmed the main challenges of farmers; offering solutions adaptable in practice; bottoming the gaps between demand and supply
  ii) identifying the needs of small structured regions/small scale farms presenting potential solutions; analysing the barriers and gaps between development and practice
  iii) inviting innovators (researcher, start-ups, consultant) and funders to create potential project groups with funding background.

Selection of Smart Farming Technologies

- Description of the method followed to select Smart Farming Technologies (SFTs) of interest to the regional stakeholders.
  SFTs were selected following the results of Task 2.2 questionnaire. There, the focus laid on improving input efficiency, data management and socio-economic benefits by introducing SFTs.
- Listing of SFTs presented at the workshops:

№	Name of SFT	SFT Category	Cropping system	Purpose
1	365Farmnet	• Product	• Arable • Tree • Vegetables • Vineyards • Grassland	• Farm management information system
2	MyJohnDeere	• Product	• Arable • Tree • Vegetables • Vineyards • Grassland	• Farm management information system
3	Agricircle	• Product	• Arable • Tree • Vegetables • Vineyards • Grassland	• Farm management information system
4	DKE Data Hub	• Development	• Arable • Tree • Vegetables • Vineyards • Grassland	• Farm management information system
5	CNH Farming Platform	• Product	• Arable • Tree • Vegetables • Vineyards • Grassland	• Farm management information system

6	Isaria	• Product	• Arable • Grassland	• Mapping/recording • Reacting/Variable rate technology •
7	NEXT farming	• Product	• Arable	• Mapping/recording • Reacting/Variable rate technology • 8Farm management in9formation system
8	Rauch variable rate Fertilizer Spreader	• Product	• Arable • Grassland	• Reacting/Variable rate technology
9	Amazone variable rate Fertilizer Spreader	• Product	• Arable • Grassland	• Reacting/Variable rate technology
10	YARA N-Sensor and Image IT	• Product	• Arable	• Mapping/recording • Reacting/Variable rate technology
11	Fliegl Manure Sensing	• Product	• Arable • Grassland	• Mapping/recording • Reacting/Variable rate technology
12	Kuhn Multispray	• Product	• Arable • Vegetables • Vineyards	• Reacting/Variable rate technology
13	BASF Maglis Leaf Analysis	• Product	• Arable • Vegetables	• Reacting/Variable rate technology
14	ENAS Fraunhofer Institute Biodegradable Microsensors	• Research	• Arable • Tree • Vegetables • Vineyards • Grassland	• Mapping/recording • Reacting/Variable rate technology •
15	Agra2b	• Product	• Arable	• Market tool
16	Vantage	• Products	• Arable • Grassland	• Mapping/recording • Reacting/Variable rate technology • Guidance/Controlled Traffic
17	Zunhammer Van Control	• Product	• Arable • Grassland	• Mapping/recording • Reacting/Variable rate technology

Funding source for project ideas – grants and open calls

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Other info
	EIP Agri	EU	Regional on level of federal states	Operational groups of min. 2 farmers with focus on agricultural developments	Operational groups and sub contractors	Personnel costs. sub contractor costs. publications.	depending on status of SME. Up to 100% for research institutions	
	Programm zur Innovationsförderung	Ministry of Food and Agriculture	National	Individual funding of experimental development groups for different scopes in plant/animal/management developments	Individual partners. Industry, Research, Farmers	Personnel costs. sub contractor costs. publications	depending on status of SME. Up to 100% for research institutions	Link
	Deutsche Innovationspartnerschaft Agrar	Ministry of Food and Agriculture	National	Individual funding of experimental development groups for different scopes in plant/animal/management developments	Individual partners. Industry, Research, Farmers	Personnel costs. sub contractor costs. publications	depending on status of SME. Up to 100% for research institutions	Link
	Landwirtschaftliche Rentenbank	Ministry of Food and Agriculture	National	Individual funding of experimental development groups for different scopes in plant/animal/management developments	Individual partners. Industry, Research, Farmers	Personnel costs. sub contractor costs. publications	depending on status of SME. Up to 100% for research institutions	Link

**General individual and collaborative R&D&I projects, agri-food specific R&D&I grants programmes, Operational Groups Calls under RDPs, Innovation vouchers for the purchase of external expertise, Proof of concept support for research results, Investment grant for equipment modernisation, Public procurement process.*

3. Findings

3.1. Identification of barriers and incentives for adoption of SFTs

Barriers:

data security / data sovereignty:

- "depth of surveillance" increases
- "German-Angst" (typical conservative)
- new data followed by new business models (not yet foreseeable)
- fear of monopolism of only few data-managers
- higher official requirements with higher transparency

user friendliness:

- synchronising machine data easily
- high complexity with improved systems
- low operator convenience
- "technology first – user second"
- for decision support (at the moment a lot machine control)

input – benefit – relationship:

- low reliability of technology
- high investments
- profit for the farmer not yet clear
- high subsequent costs
- missing clear communication of added values

deficit of information:

- lack of information and education
- lack of communication
- lack of know how transfer

Political instruments to overcome barriers:

infrastructure:

- mobile connectivity (5G) nationwide also for farmers
- broad band expansion in rural areas
- providing access to geodata nationally

support of adaption:

- state subsidy for new technologies
- "intelligent" financial support (new ways for subsidies)
- farm cooperatives for adaption of new technologies
- "digital bonus" for agriculture

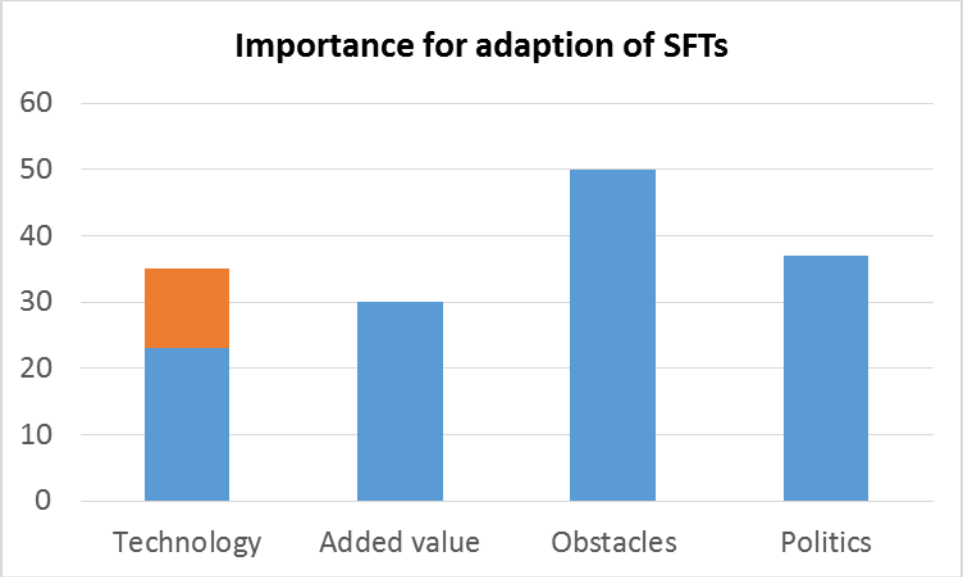
education:

- integrating new technologies in education!
- train the trainer in new technologies
- improved systems for lifelong learning
- newest equipment in colleges and universities

Outcomes especially of RIW2

After the working group and final discussion we asked all participants to rate the importance of the four questions regarding their importance for introducing SFTs in practical farming. Therefore, every participant got 3 stickers to put it onto the section rated most important.

Following distribution was to be observed after analysing the numbers (not representative).



Within the chapter of "which technology for small-structured regions?" we decided to split the number into two steps of evaluation. First (the blue part), 23 points were counted for the importance of additional and further developed technology. Second (the red part), 12 points were given for the GPS-technology to be the key technology for further introduction of SFTs in practical farming. As GPS is already a well adapted and accepted technology, we exclude it from evaluating the importance of the four chapters.

Out of that, we see that the "obstacles" mentioned above are the most important aspects to work on when introducing SFTs. Second, the part of politics and research play an important role when SFTs should be introduced in agriculture. Third place, the added values of SFTs seem to be in focus by the participants of this workshop.

3.2. Interest on existing SFTs – most demanded SFTs

As stated above, it seems that in Hub Germany there is already a sufficient offer of potential SFTs, however, the adoption into practical farming has not yet taken place due to some facts:

- improved decision support by digital tools (not yet fully accomplished)
- easy to use for farmers (often still too complex)
- acceptance of new tools also in the society (versus industrial agriculture)

3.3. Research needs in Smart Farming

Research:

- easy to use of software (new fields of research)
- increased independent research for SFTs
- neutral evaluation of SFTs

3.4. Other relevant findings

3.5. Potential collaborations identified

<Please, fill in the table below with the potential collaborations identified in the workshops>.

No.	Category of collaboration	Related SFT	Cropping system	Short description of potential collaboration
1	Project group	Biodegradable microsensors	Arable Vegetable Vineyards	*Plant protection is one of the most important topics when it comes to crop management. Forecast models can support decisions for sustainable pest management. Sensors for recording data are costly and depend on service to provide data. Observing crop stand microclimate shoud be cheap in hardware and management and therefore cover relevant crops and regions to deliver adequate data for pest infection modelling.* *Aim:* ➢ Develop cheap and biodegradable micro sensors for microclimate observations. ➢ Develop data receivers to collect sensor data in the field ➢ Provide a data hub for providing data in a model friendly format

4. Recommendations

4.1. Sustainability and mainstreaming of Smart-AKIS results

DLG did benefit in getting deeper insights in specific smart farming tools and the opinion of farmers regarding SFTs. In future this topic will go parallel to other activities DLG undertakes to foster sustainable farming systems using innovative ideas. DLG has already a sound network within its committees covering representatives of all stakeholders in the branch up to the level of food industry. DLG does not aim to embed the Smart-AKIS platform into its own database, however, communicating its uniqueness whenever DLG is highlighting a topic relevant.

4.2. Adoption of Smart Farming Technologies

DLG is partner in several research projects dealing with SFTs. Moreover, the testing centre of DLG is known to test and verify new technology for farmers needs and its sustainability. DLG yearly organizes more than 120 events, conferences, seminars and workshops dealing with the topics of modern and future agriculture developments. We use those events to transfer knowledge from science to practical farming including SFTs. We will regularly match our experiences with the outcomes of the Smart AKIS platform as to keep us up to date.

4.3. Strengthening Innovation in Agriculture

The results show that already a number of ideas are in the market. Farmers postulated that there is no

real need of new technology but get the ones available fit for practical farming. Too many bugs and mis-adjusted parameters are still to be found in SFTs available. There must be financial support for not only developing new technology but improving and adapting actual SFTs to the needs in practical farming.

4.4. Smart Farming R&D agenda

Short-term: developing standard interfaces – one of the biggest needs when farmers were asked.
Long-term: autonomous robotic systems for crop establishment, crop protection, fertilizing and harvest. Highlighting the chance to so introduce new cropping systems and structures and at the same time improve the environmental impacts of farming.

5. Annexes

5.1. Minutes of the Regional Innovation Workshops

5.1.1. RIW1

SMART AKIS 1st REGIONAL INNOVATION WORKSHOP

30. May 2017,DLG-IPZ Bernburg

Programme

Welcoming and Coffee

Welcoming the guests and introducingthe project ‚Smart-AKIS (Agriculture Knowledge and Information System, www.smart-akis.com)

Short introduction of the smart farming tools in the field of

- Digital platforms
  - CNH Industrial
  - 365farmnet GmbH
  - John Deere GmbH & Co.KG
  - Agricircle Deutschland GmbH
  - AGCO Internatinal GmbH
- Fertilization
  - Fritzmeier Umwelttechnik GmbH&Co. KG
  - FarmFacts GmbH
  - Rauch Landmaschinenfabrik GmbH
  - Amazone Werke H. Dreyer GmbH&Co.KG
  - Yara GmbH&Co.KG
  - Fliegl Agrartechik GmbH
- Crop protection
  - Kuhn Maschinen-Vertrieb GmbH
  - BASF SE
  - Fraunhofer Institut for Electronic Nano Systems ENAS

Lunch break

Answering the most important questions, as well as discussion in work groups (one group per field)
Summary, presentation and discussion of the workgroup results
Match and Meet, open discussion Coffee and cakeserved
Resume and perspectives for the Project
End

RIW1 Power Point presentations

Subsequent the presentation (Introduction) of Klaus Erdle is provided. The presentations of the companies and institutions will be provided in the digital appendix.


Brauchen wir das wirklich oder kann das weg?
SMART AKIS
REGIONAL INNOVATION WORKSHOP
30. Mai 2017, DLG-IPZ Bernburg
smartAKIS
Smart Farming Thematic Network


smartAKIS
TITEL: European Agricultural Knowledge and Innovation Systems (AKIS) towards innovation-driven research in Smart Farming Technology.
Gefördert durch Horizon 2020
Zeitdauer: 30 month from march 2016.
Partnerschaft: 13 Partner aus 8 Ländern in den Bereichen: Wissenschaft, Praxis, Beratung und Industrie
SMART AKIS PARTNERS:
Delphy
zalf
INTIA
CEMA
ACTA


smartAKIS
2. Ziele und Ergebnisse


smartAKIS
• Unterstützt durch die Europäische Innovationspartnerschaft "Landwirtschaftliche Produktivität und Nachhaltigkeit" (EIP-AGRI) und gefördert durch das Horizon 2020 Programm für:
✓ Sammlung von Wissen und "Best practice"-Ansätzen deren breite Umsetzung in die Praxis noch unterstützt werden kann
✓ Übersetzung der Erkenntnisse in nutzerfreundliche Formate
• Einbeziehung einer großen bandbreite von Akteuren::
✓ Landwirte,
✓ Wissenschaftler,
✓ Industrie,
✓ Servicedienstleiter/Berater
eip-agri
DLG


smartAKIS
Ziele des Projektes:
• BESTANDSAUFNAHME: Erstellung eines Online-Kataloges über anwendbare Applikationen / Lösungen aus Wissenschaft und Industrie.
• BEWERTUNG: Bewertung von Nutzer-Bedarfen und Interessen sowie Identifikation von Faktoren welche die Übertragung in die Praxis beeinflussen.
• INNOVATIONS ZENTREN: Initiieren von Kollaborationen und Projekte mit Landwirten, Forschung, Industrie, Beratung....
• SMART FARMING PLATTFORM: Entwicklung eines Online-Systems für die Bewertung von Smart Farming Lösungen und die Möglichkeit des "Crowd-Sourcing" neuer Ideen.
• NETWORKING: Enge Kooperation mit EIP-AGRI und seinen Strukturen.
DLG


smartAKIS
ANGEBOTE:
ONLINE SMART COMMUNITY PLATTFORM:
• Katalog über Smart Farming Lösungen.
• Networking-Bereich für Akteure der Branche.
BERICHTE ÜBER BEDARFE UND INTERESSEN VON LANDWIRTEN:
• Bedarfe von Landwirten in Frankreich, Deutschland, Griechenland, Niederlande, Serbien, Spanien und Großbritannien.
• Faktoren welche die EU-weite Umsetzung in die Praxis behindern.
INNOVATIONS ZENTREN:
• 7 Innovationszentren in Frankreich, Deutschland, Griechenland, Niederlande, Serbien, Spanien und Großbritannien.
• Innovation Workshops für besseres Verständnis und Umsetzung von Ansätzen in der Praxis.
DLG

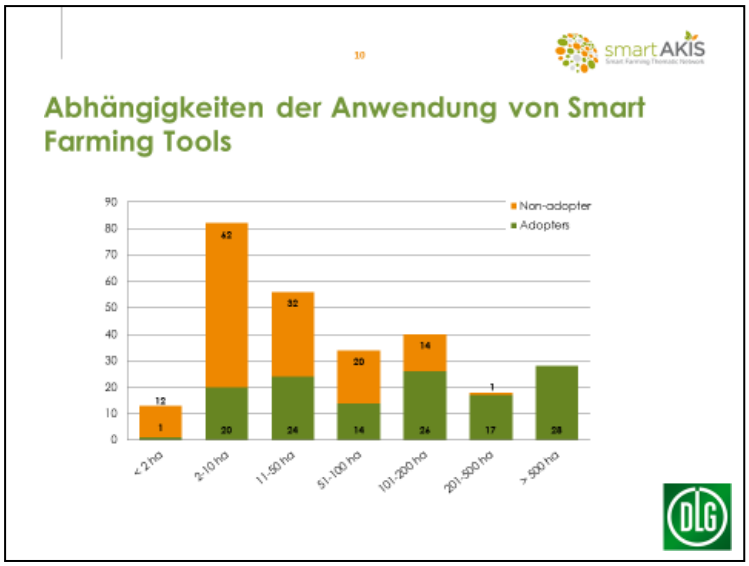
Interviews mit Landwirten:

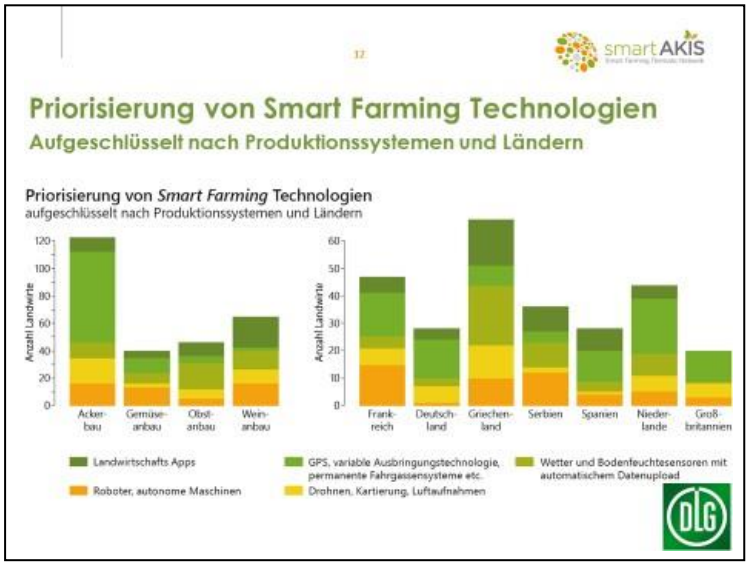
Umfrage mit 271 Landwirte aus 7 Ländern (Frankreich, Deutschland, Griechenland, Serbien, Spanien, den Niederlanden und Großbritannien)

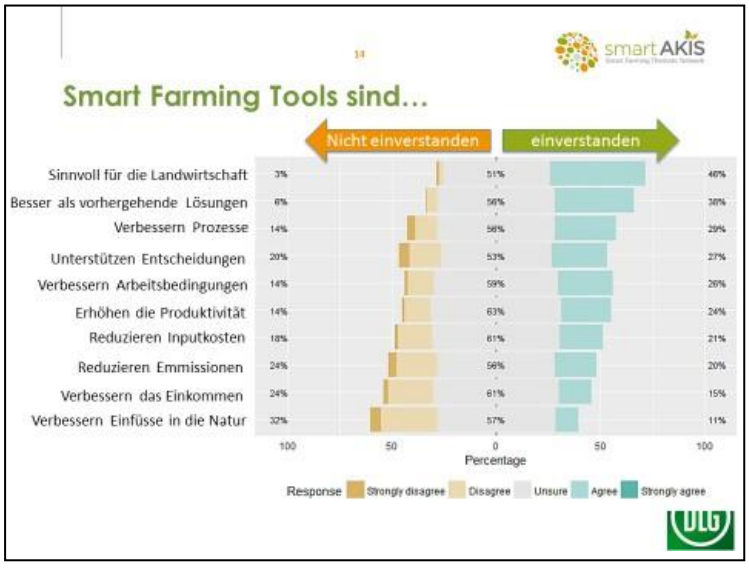
	France	Germany	Greece	Serbia	Spain	Nether-lands	UK	Total
Arable	21	25	10	16	8	26	16	122
Orchards	0	0	27	10	0	9	0	46
Field veg	16	2	4	0	4	9	4	39
Vineyards	10	1	27	10	16	0	0	64
Total	47	28	68	36	28	44	20	**271**

Wo liegen die größten Herausforderungen im Pflanzenbau?

Wahrnehmung der Relevanz einzelner Herausforderungen unter den Befragungsteilnehmern in Prozent (Ausschnitt)


10
smartAKIS
Abhängigkeiten der Anwendung von Smart Farming Tools
Non-adopter
Adopters
90
80
70
60
50
40
30
20
10
0
12
42
32
20
14
1
1
20
24
14
24
17
28
<2 ha
2-10 ha
11-50 ha
51-100 ha
101-200 ha
201-500 ha
>500 ha
DLG


12
smartAKIS
Priorisierung von Smart Farming Technologien
Aufgeschlüsselt nach Produktionssystemen und Ländern
Priorisierung von Smart Farming Technologien
aufgeschlüsselt nach Produktionssystemen und Ländern
Anzahl Landwirte
120
100
80
60
40
20
0
Acker-bau
Gemüse-anbau
Obst-anbau
Wein-anbau
Anzahl Landwirte
60
50
40
30
20
10
0
Frank-reich
Deutsch-land
Griechen-land
Serbien
Spanien
Nieder-lande
Groß-britannien
Landwirtschafts Apps
Roboter, autonome Maschinen
GPS, variable Ausbringungstechnologie, permanente Fahrgassensysteme etc.
Drohnen, Kartierung, Luftaufnahmen
Wetter und Bodenfeuchtesensoren mit automatischem Datenupload
DLG


14
smartAKIS
Smart Farming Tools sind...
Nicht einverstanden
einverstanden
Sinnvoll für die Landwirtschaft
Besser als vorhergehende Lösungen
Verbessern Prozesse
Unterstützen Entscheidungen
Verbessern Arbeitsbedingungen
Erhöhen die Produktivität
Reduzieren Inputkosten
Reduzieren Emmissionen
Verbessern das Einkommen
Verbessern Einfüsse in die Natur
3%
6%
14%
20%
14%
14%
18%
24%
24%
32%
51%
56%
56%
53%
59%
63%
61%
56%
61%
57%
46%
38%
29%
27%
26%
24%
21%
20%
15%
11%
100
50
0
50
100
Percentage
Response
Strongly disagree
Disagree
Unsure
Agree
Strongly agree
DLG


13
SFT DER ZUKUNFT
Technik, die für Landwirte den größten Nutzen bringen würde – unabhängig davon, ob diese bereits existiert oder nicht – umfasst:
• Roboter für monotone Arbeitsprozesse (z.B. Unkrautbekämpfung)
• Echtzeit-Diagnose mit Drohnen, Satellitenbildern oder Smartphone-Sensoren (z.B. Bodeneigenschaften)
• Integration verschiedener SFT und
• Datenbereitstellung zur Information und als Entscheidungshilfe.


15
HEMMNISSE UND HANDLUNGSBEDARF
Kosten und Kompatibilität sind die meist genannten Hemmnisse für die Nutzung von SFT.


18
10:20 Uhr
Kurzvorstellung von Smart Farming Tools aus den Bereichen
• Digitale Plattformen
- CNH Industrial
- 365farmnet GmbH
- John Deere GmbH & Co. KG
- Agricircle Deutschland GmbH
- AGCO International GmbH
• Düngung
- Fritzmeier Umwelttechnik GmbH & Co. KG
- FarmFacts GmbH
- Rauch Landmaschinenfabrik GmbH
- Amazone Werke H. Dreyer GmbH & Co.KG
- Yara GmbH & Co. KG
- Fliegl Agrartechnik GmbH
• Pflanzenschutz
- Kuhn Maschinen-Vertrieb GmbH
- BASF SE
- Fraunhofer Institut for Electronic Nano Systems ENAS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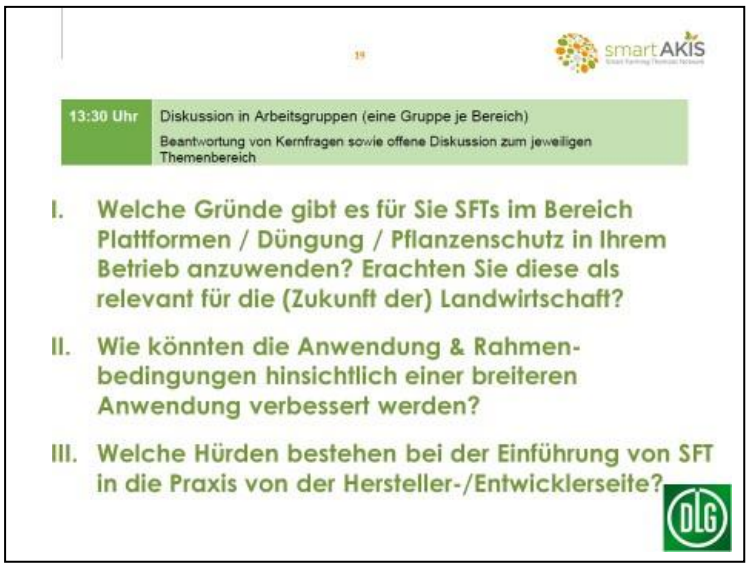
4. Der Workshop selbst.


smartAKIS
13:30 Uhr
Diskussion in Arbeitsgruppen (eine Gruppe je Bereich)
Beantwortung von Kernfragen sowie offene Diskussion zum jeweiligen Themenbereich
I. Welche Gründe gibt es für Sie SFTs im Bereich Plattformen / Düngung / Pflanzenschutz in Ihrem Betrieb anzuwenden? Erachten Sie diese als relevant für die (Zukunft der) Landwirtschaft?
II. Wie könnten die Anwendung & Rahmen-bedingungen hinsichtlich einer breiteren Anwendung verbessert werden?
III. Welche Hürden bestehen bei der Einführung von SFT in die Praxis von der Hersteller-/Entwicklerseite?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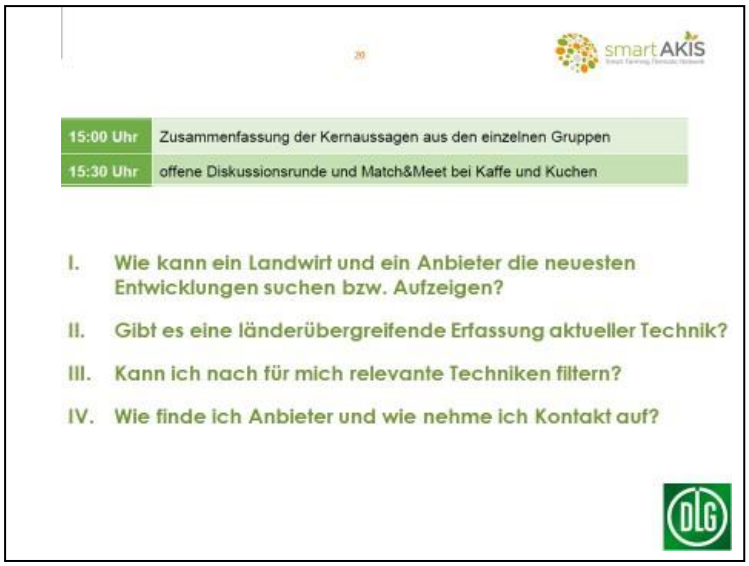
Abschluss mit freier Diskussion, Match&Meet,...
Der Workshop ist auch Plattform für den Austausch untereinander – nutzen Sie die Chance Kontakte zu knüpfen.



15:00 Uhr	Zusammenfassung der Kernaussagen aus den einzelnen Gruppen
15:30 Uhr	offene Diskussionsrunde und Match&Meet bei Kaffe und Kuchen

I. Wie kann ein Landwirt und ein Anbieter die neuesten Entwicklungen suchen bzw. Aufzeigen?

II. Gibt es eine länderübergreifende Erfassung aktueller Technik?

III. Kann ich nach für mich relevante Techniken filtern?

IV. Wie finde ich Anbieter und wie nehme ich Kontakt auf?

Digitale Plattformen

Wie Anwendung / Rahmenbedingungen verbessern?

- Klare Vereinbarungen zu Daten-Eigentum und Rechtssicherheit – Datenschutzlabel zu Digitalen Plattformen
- Anonymisierter Datenauswerter
- Genormte Schnittstelle
- Möglichkeit zum Anbieterwechsel
- Netzabdeckung flächendeckend und Möglichkeit zur Offline-Fähigkeit
- Entscheidungsmöglichkeit zur Datenfreigabe-Differenzierung
- Bessere Wetterprognosen
- Fall-backlösung – alles auf dem Handy
- Verbesserung Ausbildung/Beratung (auch Grundlagen Pflanzenbau)
- „Give and Take" gefühlt ungleich

Digitale Plattformen

Gründe für die Verwendung im Betrieb:

- Effizienz / Zeitersparnis
- Überblick zum Betrieb, aktueller Status
- Aktualität z.B. von Spritzmittelzulassungen (schon realisiert?)
- Informationsweitergabe/infrastruktur
- Möglichkeit zum Anbieterwechsel ohne Datenverlust
- Weg von Insellösungen
- Regularien erfüllen, z.B. CC-Konformität
- Hilfe für Betriebe, unabhängig von Betriebsgröße
- Kosten sparen, Erträge steigern
- Entscheidungshilfe (Betriebszweigübergreifend)
- Datenfriedhöfe vermeiden

Subsequent slides were used as summary of the the thematic working groups and basis for the final discussion as to complement criterias regarding the specific topics.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Düngung
Wie Anwendung / Rahmenbedingungen verbessern?
• Easy to use im Feld
• Einfachere Datenverarbeitung (große Datenmengen)
• Ertragspotentialschätzung (um Potentiale auszunutzen)
• Bessere Beratung / Ausbildung
• Neutrale Prüfung (Ringversuche, Plattform, Austausch)
• Motivation von Landwirten (Anschubförderung o.ä.)
• Anschaffungskosten
• Definition "Was ist Smart Farming"
• Zu technik-orientiert (umfängliche Lösungen Hardware/Software/Pflanzenbauliche Kenntnisse / Algoritmen)
• Standardisierung
• Druck von außen (DüVO) (Effizienz, Logistik,...)


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Pflanzenschutz
Gründe für die Verwendung im Betrieb:
• Wirtschaftlichkeit und Komfort
• Mehrfachnutzung der Bestandesinformationen


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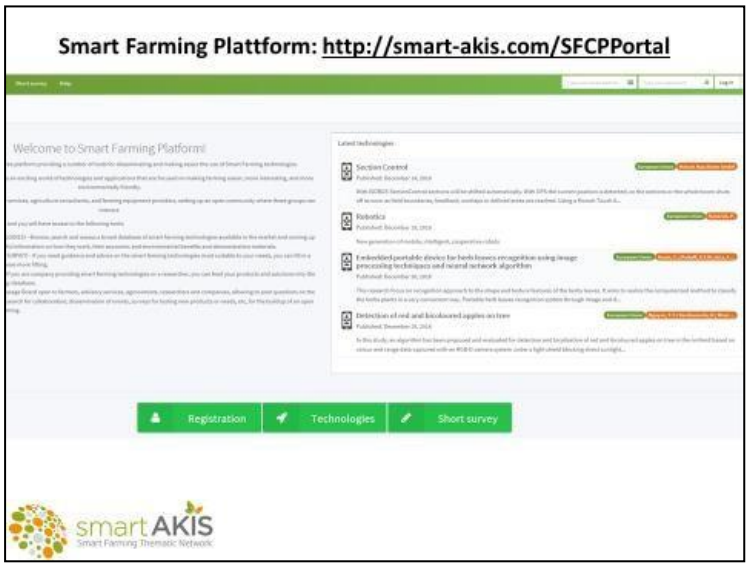
Pflanzenschutz
Wie Anwendung / Rahmenbedingungen verbessern?
• Einfache und automatisierte Anwendung
• Entscheidungsfällung im gesamten Produktionssystem unterstützen

Following slides where presented after the final discussion. The Smart Farming Plattform was introduced by Klaus Erdle, DLG.



I. Wie kann ein Landwirt und ein Anbieter die neuesten Entwicklungen suchen bzw. Aufzeigen?

II. Gibt es eine länderübergreifende Erfassung aktueller Technik?

III. Kann ich nach für mich relevante Techniken filtern?

IV. Wie finde ich Anbieter und wie nehme ich Kontakt auf?

Smart Farming Plattform: http://smart-akis.com/SFCPPortal

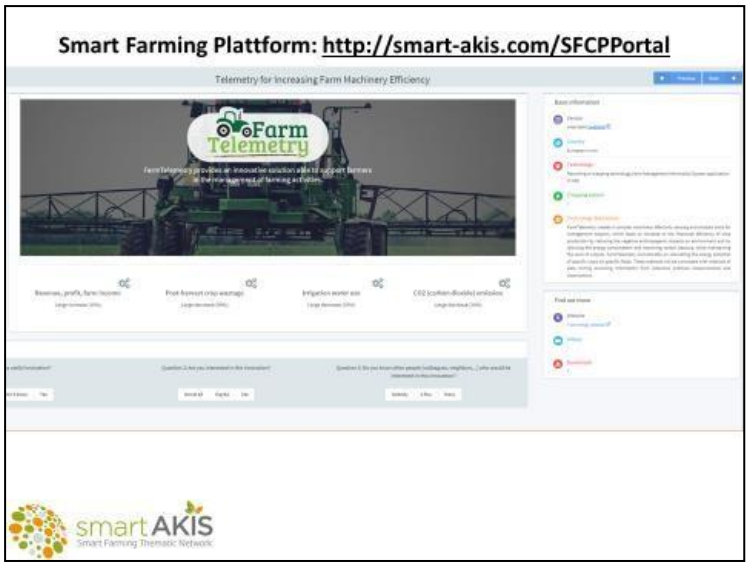
Smart Farming Plattform: http://smart-akis.com/SFCPPortal

Für Landwirte:

- Keine Registrierung notwendig (!)
- Filter zur Vorsortierung der Relevanz
- Kurzüberblick über Technologie
- Schneller Link zu Anbieter / Entwickler
- Europaweit

Für Entwickler / Anbieter:

- Keine persönlichen Daten bei Eingabe von Produkten / Entwicklungen
- Überblick über Entwicklungen / Angebote
- Wiedergabe von Fakten in Kurzform
- Hinterlegung von Videos, Informaterial, Link zur



RIW1 Attendance Sheets

Due to the protection of data privacy the attendance lists will not be published in the report. The project does not have the agreement of all participants to publish names and contact data.

For internal reporting issues, the attendance lists are available from project partner DLG.

RIW1 Pictures


Digitale Plattformen

Below, the invited operational group 'Sustainable Irrigation' (EIP-Agri) from the federal state Lower Saxony and the Ostfalia University of Applied Sciences presented results of the project *'Sensor-based irrigation control in potatoes':*

RIW1 Findings

Discussion of the needs and ideas identified on WP2

For the 1st Regional Innovation Workshop in Germany 14 companies and institutions were invited to present new developments and research results regarding Smart Farming Technologies and Tools (SFT). Before introducing the SFTs, the main results of WP2 farmer interviews were presented to build up a common basis of understanding for the needs of famers regarding new tools. It was agreed about the main impact areas of plant protection and nutrient management (strongly connected to soil protection) as well as data management in German arable farming. Many farmers are already using steering systems or electronic field

catalogues as well as apps (e.g. weather forecast) which seem to be the doorways for further adoption of SFTs in agriculture. Having those tools, further electronic systems may be connected and integrated into the productions system. Now it seems to be crucial to find tools which can easily be linked to existing systems and have shown to deliver comprehensible advantages (environmental, economical, social).

Many of the findings of WP2 could be verified and even supplemented during the exchange in the discussion groups and in general during the entire workshop day. Reasons to use SFT`s, barriers in adoption and challenges for SFT-provider are listed subsequent in the report.

Relevance of SFTs regarding needs and ideas identified in WP2

The SFTs selected for the RIW were chosen to be relevant in three fields of plant production: digital platforms, plant nutrition, and crop protection. At the same time farmers struggle with the idea that an extensive use of SFTs could make basic knowledge of climate-soil-plant interactions getting lost. In some areas of the farming community, a certain decrease of this knowledge could be observed especially in areas of intensive cropping systems optimized for maximum economic outcomes. The discrepancy between economy and ecology is another major concern within the farming community. At the same time, farmers realize the chance of better understanding processes by using SFTs in the right way.

Digital platforms play a major role in nowadays discussions. The exchange of data and knowledge is a sensitive topic suspected to misuse data of farmers and their production systems. A crucial question is who the owner of the data is, the farmer or the companies which offer the service or the technology. 5 companies working in the area of online platforms used the chance to get in contact with stakeholders.

The field of plant nutrition and fertilizer application was represented by 5 developers and providers. With the new German fertilizer ordinance becoming effective by June 2, farmers need tools to improve nutrient management. Especially the use of nitrogen and phosphorus is strongly regulated and restricted by the new ordinance. Therefore, the knowledge of crop status, soil nutrient contents, and application control needs to be improved. Parallel to that, the extent of documentation is increasing so digital reporting systems are highly desired. The introduced tools ranged from improved application planning through mineral and organic fertilizer application. The broad range of SFTs in this subject promised fruitful discussions with the stakeholders.

Plant protection in crop production is facing major challenges in near future. In contrast to the reduction of chemical actives on the market, an increase in resistances of insects and weeds is observed in the last few years. Crop production needs new tools to decrease chemical pest management as to save those tools for the future and decrease the risk of resistances and at the same time application must be optimized in timing, local accuracy, and documentation. Three representatives of industry and research informed about SFTs in crop protection. Next to

application planning and sprayer technology a research project about bio-degradable sensors was introduced.

Each representative was allowed max. 10 minutes to visualise his ideas or system to the 68 participating farmers, consultants, and researchers.

All introduced SFTs were relevant to answer the questions raised in WP2. However, digital platforms in the meanwhile show interferences with fertilizer application systems and crop protection tools. Regarding the digital platforms, the topic of data security and data sovereignty were focused more than its definite functions in farming systems

Interest on adopting or transferring proposed SFTs

Within the SFTs focused in this workshop, two groups could be separated in their kind and extent of usage in practice. While tools for fertilizer and pesticide application could be adopted quite well having a direct effect on the production system, digital platforms are observed more sceptic by farmers with a missing direct benefit within the production system.

In fertilizer management, the tool for sensing the actual nutrient status of a crop canopy (YARA, Fritzmeier, FarmFacts) is one promising solution to improve nutrient supply. Combined with a tool of predicting future nutrient demand (YARA, FarmFacts) a whole system is provided for optimal nutrient management. As organic fertilizing with slurry or manure gets more restricted and less manageable with the new ordinance, the sensor, measuring manure nutrient contents online during application (Fliegl) is a desired solution for crop production. Out of that, knowledge of nutrient amounts applied on a field could be collected and documented for further decision making.

In crop protection, app-based systems to identify pests and recommendation for treatment (BASF) are new ideas in threshold- and target-oriented crop protection. The second step after identifying pests is an optimized application system. Improved boom control and nozzle triggering (KUHN) may help to reduce drift and environmental impacts in the field.

Finally, and for all systems very interesting, new sensor developments (Fraunhofer Institute) could improve climate, soil, and plant observation for an improved crop management. Biodegradable micro-sensors with costs of only few Euro-Cents promise an economic and broad monitoring of field characteristics and dynamics to better understand interactions and, eventually, an improved crop management.

Identification reasons to use, barriers and challenges for providers of SFTs.

Reasons to use SFTs:

…regarding Digital Platforms:

- increasing efficiency in organizing processes (logistics, accounting,…)
- having detailed overview about current status of different farm sections

(husbandry, crops, energy,…)
- sharing information withstakeholders
- reducing risk of isolated systems going to cloud based solutions
- meet regulations, e.g. CC Conformity
- simplify documentation
- support in decision making and planning/organization

…regarding fertilizer management:

- managing soil heterogeneity
- knowledge and meeting local yield potentials
- reducing environmental impacts (N-losses, eutrophication,…)
- reduce workload in nutrient management
- assistance in documentation
- field management (logistics, soil sampling,…)
- availability of actual data about soil and crop status
- data collection and management for better decision making
- tool for better decision making (in contrast to automation)
- Know-how transfer

…regarding crop protection:

- following regulations in crop protection
- considering spatial heterogeneity of pests and weeds within a field
- reducing spraying rates
- reducing environmental impacts (losses, drift,…)
- support in resistancemanagement
- improving efficacy of applied active
- documentation of application conditions (wind, temperature, crop status,..) for administration
- improve logistics (watertransportation,…)
- improving ergonomics andcomfort
- increasing user safety
- collecting crop status information for further management decisión

Barriers avoiding adoption of SFTs:

…regarding Digital Platforms:

- missing clear agreements regarding data sovereignty and legal certainty
- missing neutral institution responsible for data analysis
- missing standards forinterfaces
- missing possibility of (quick and extensive) change of provider

- missing extensive net coverage in rural areas and/or offline-mode of apps and online systems
- missing selective data exchange with different stakeholders
- scepticism about balance between offered data (farmer) and received information (provider)
- SFT´s still tooexpensive
- handling still too complicated and bugged

…regarding fertilizer management:

- deficit in terms of easy adoption (a thorough knowledge about specific technical conditions has to be given to use SFTs)
- deficit in transferring big data volumes
- missing combination with yield-forecast systems to better estimate potentials
- missing neutral tests (field trials, platforms, experience exchange)
- missing financial incentives to cover high acquisition costs
- missing of covering system-based solutions (solutions for single symptoms in contrast to the consideration of the whole technology-plant-soil system)
- need of external pressure for increased adoption (regulations considering SFTs)

…regarding crop protection:

- missing of (semi)automatedsystems
- combination with other management measures (seeding, fertilizer management, cultivars,…)
- more flexible switch between nozzle types considering spatial application in the field
- spatial application of different actives during one passage

General limits of SFT adoption in practical farming are the mostly missing compatibility of different systems, especially between different brands. Unlike in the USA, Europe´s farming systems are characterized by the use of several brands and systems within one farm. Therefore, a basic prerequisite is the quick and easy combination of different systems and data formats. Furthermore, consultants and farmers agreed, that actual education does not meet the needs of using SFTs in farming. At the same time, basic knowledge about soil-plant-climate interactions and basic plant production seem to get lost. For the use of SFTs – regardless type or extent – a thorough understanding of plant production is needed.

Challenges for providers of SFTs:

- missing standards ofinterfaces
- hardware development is lagging behind the progress of software solutions
- difficulties in cost effectiveness on providers side
- missing willingness of customers to pay realistic prices – often request for free-

of- charge solutions (apps,…)
- association of “digitalization” with “regulatory documentation” – therefore missing motivation of farmers
- missing knowledge, understanding and education in the use of SFTs
- insufficient mobile/digital infrastructure in Germany
- difficulties of providers resources to meet farmers demand (whole system solutions versus specialized provider)
- difficult communication between provider and user

Further, statements during the discussion, partly very controversial, could be explored further (e.g. following workshops). For example, on the one hand, a farmer stating the resignation of being a ‘guinea pig’ for premature and bugged SFT systems on the market and on the other hand the reservation and the wait-and-see position on direct request of a machine provider, what is demanded in practice.

Ideas for potentials for existing SFTs.

Information collected with crop sensors should not only used for nutrient management but also for other operations like i) crop protection and ii) crop status documentation regardless fertilizer supply.

i) sensors used for nutrient management should also be a used as tool for crop protections measures. Scanning crop status (biomass, height, density), those data may also support crop protections applications in varying spraying rates considering crop status. By developing further algorithms, sensors could help to detect pests and/or weeds for a target specific application.

ii) regardless of the time of year, the crop status scanned by a sensor delivers useful information about crop development, growth rates, stress or other physiological parameters. That information could be integrated into a crop monitoring system as to support management decisions or even (in connection with weather forecast) could predict upcoming measures to do. The comprehensive data recording can also be useful by documenting the history of fields to detect long-term impacts of agricultural production and trends of development in the future.

Digital Platforms may not only be used for farm internal process management but also as data hub for market relevant information. Farmers could anonymously publish actual prices for farm inputs connected to the region where the deal was set. That information could be used by other farmers to get fair prices when ordering farm inputs and products. The integration of the demand and requests of consumers and the processing industry for traceability (quality and origin of products) is easy to implement by additional interfaces and selective data sharing.

RIW1 Project Ideas

Project Idea 1

Category of project	Smart Farming Technology	Crop system
Technology transfer	*Micro Sensors*	*Arable* *Tree* *Vegetables* *Vineyards* *Grasslands*
Promoter/s name/s		
Fraunhofer ENAS, Chemnitz (Germany)		
Short description of project		
Introduction of cheap and biodegradable micro sensors into crop monitoring. Recording of micro climate in canopies and soil parameters. Combination with decision tools for crop protection, irrigation andfertilizing		
Multi-actor collaboration needed		
Indication of the profile of partners sought after: Research *Industry* *Advisory* *Farmer* *Test and validation of microsensors in the field. Interface to already existing technologies for data management and development of suitable algorithms.*		

RIW1 Evaluation

During the workshop 51 (75 % of participants) evaluation sheets were filled. Their remarks and ratings are incorporated in the following evaluation summary.

INTEREST

Please, rate the interest of the Workshop to your day to day work from 1 (very low interest) to 5 (very high interest)	**Score** **3,1**
Please, point out the presentation more interesting to your work.	
-ENAS micro sensors -digital platforms -Agricircle solution -BASF leaf analysis App	

ORGANIZATION

Please, rate your satisfaction with the logistical organization the Workshop (programme, registration, venue, catering etc) from 1 (very low level of satisfaction) to 5 (very high level of satisfaction)	**Score** **3,2**
Please, point out organizational improvement areas for next Workshops	

-improve acoustics in the room -earlier announcement of time and date of workshop -internet connection in the room

METHODOLOGY

Please, rate your satisfaction with the methodology of the Workshop (quality of presentations, tools and means for interaction used, rapporteuring) from 1 (very low level of satisfaction) to 5 (very high level of satisfaction)	**Score** **3,3**
Please, point out methodological improvement areas for next Workshops	
-increase number of practical farmers -more time for discussion	

SMART FARMING TECHNOLOGIES (only for 1st RIW)

Please, rate your satisfaction with the relevance and interest of the Smart Farming Technologies presented from 1 (very low level of satisfaction) to 5 (very high level of satisfaction)	**Score** **3,0**
Please, point out the top 3 Smart Farming Technologies presented from your point of view	
Please, confirm if you have already used the Smart AKIS database or if you intend to use it shortly:	
Yes about 60%	**No**

PROJECT IDEAS

Please, rate your satisfaction with the relevance and interest of the Project Ideas shared from 1 (very low level of satisfaction) to 5 (very high level of satisfaction)	**Score** **3,0**
Please, point out the top 3 Project Ideas shared	
Please, confirm if you plan to promote or get involved in a multi-actor Project:	
Yes about 31%	**No**

SUGGESTIONS

Anything else you would like to communicate Smart AKIS Network
-very good time management -separate rooms for working groups (noisy)

5.1.2. RIW2

SMART AKIS 2nd REGIONAL INNOVATION WORKSHOP

24. October 2017, Poing-Grub

RIW2 Programme

Second Regional Innovation Workshop Germany, 24th October 2017

Small scale, big effect? Is digital technology able to increase benefits in small scaled agricultural regions?	
9:30	Welcoming
10:00	Introduction of LfL project group digitalisation, PD Dr. Markus Gandorfer (Bavarian State Research Center for Agriculture) Introduction of the project Smart AKIS (Klaus Erdle, DLG)
10:20	Short introduction of smart farming tools by providers agra2b GmbH FarmFacts GmbH Fritzmeier Umwelttechnik GmbH & Co. KG Vantage ES GmbH Zunhammer GmbH Farmbörse GmbH
12:30	Lunch break
13:30	Discussion in work groups (World-Café) Open discussion in groups as to find answers to Which digital innovations are suited particularly for the input in small-scaled agricultural areas? Where does the added value lie? (economy, ecology, social) of the digitalization in small-scaled agricultural areas Identification from obstacles of acceptance of the digitalization in small-scaled agricultural areas? Political need for action or need for research against the background of small-scaled agricultural areas
15:00	Coffee break
15:30	Summary, presentation and discussion of the work group results as well as additions and interpretations
16:15	Resume and perspectives for the project
16:30	End

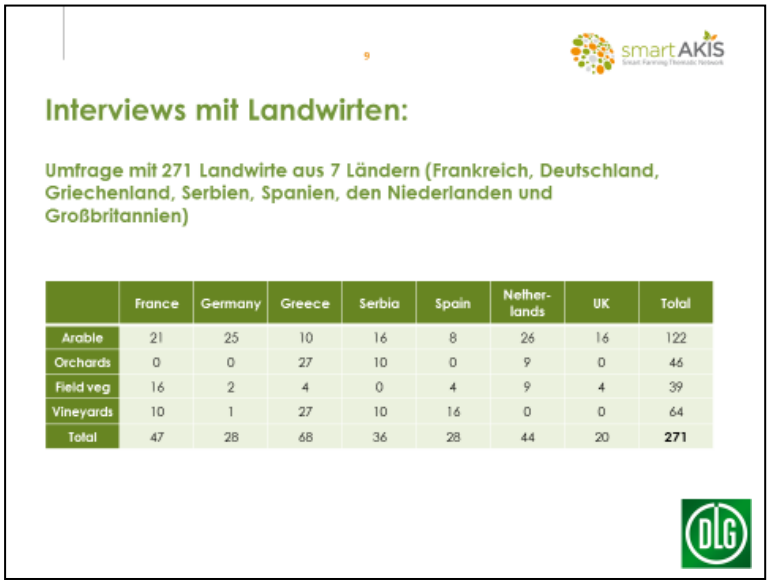
RIW2 Presentations

Subsequent the presentation (Introduction) of Klaus Erdle, DLG e.V. , is provided. The presentations of the companies and institutions will be provided in the digital appendix.

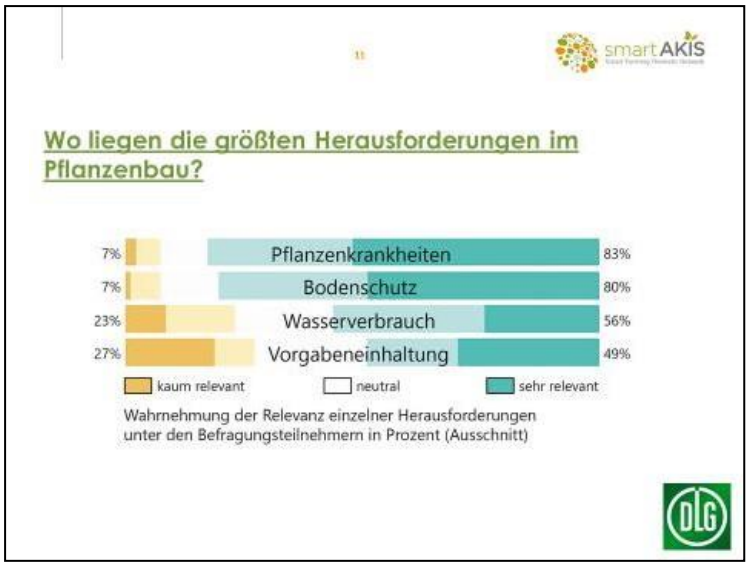

smartAKIS
TITEL: European Agricultural Knowledge and Innovation Systems (AKIS) towards innovation-driven research in Smart Farming Technology.
Gefördert durch Horizon 2020
Zeitdauer: 30 month from march 2016.
Partnerschaft: 13 Partner aus 8 Ländern in den Bereichen: Wissenschaft, Praxis, Beratung und Industrie
SMART AKIS PARTNERS:
Delphy
zalf
INTIA
CEMA

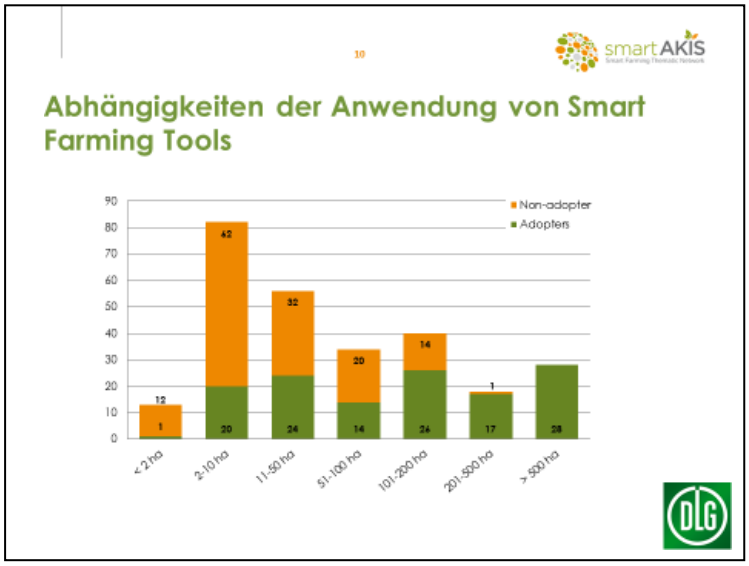

smartAKIS
2. Was bringt das Projekt?

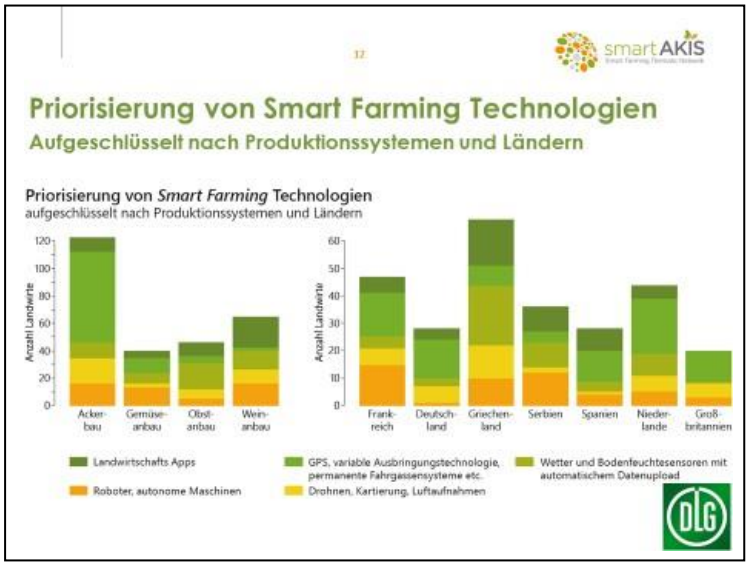

smartAKIS
Ziele des Projekts:
BESTANDSAUFNAHME: Erstellung eines Online-Kataloges über anwendbare Applikationen / Lösungen aus Wissenschaft und Industrie.
BEWERTUNG: Bewertung von Nutzer-Bedarfen und Interessen sowie Indentifiaktion und Faktoren welche die Übertragung in die Praxis beeinflussen.
INNOVATIONS ZENTREN: Initiieren von Kollaborationen und Projekten mit Landwirten, Forschung, Industrie, Beratung...
SMART FARMING PLATTFORM: Entwicklung eines Online-Systems für die Bewertung von Smart Farming Lösungen und die Möglichkeit des "Crowd-Sourcing" neuer Ideen.
NETWORKING: Enge Kooperation mit EIP-AGRI und seinen Strukturen.

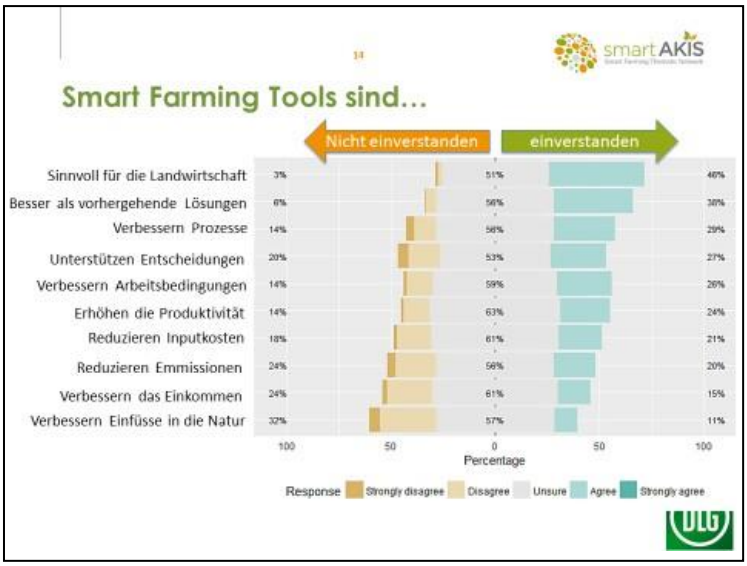


	France	Germany	Greece	Serbia	Spain	Nether-lands	UK	Total
Arable	21	25	10	16	8	26	16	122
Orchards	0	0	27	10	0	9	0	46
Field veg	16	2	4	0	4	9	4	39
Vineyards	10	1	27	10	16	0	0	64
Total	47	28	68	36	28	44	20	**271**


11
smartAKIS
Wo liegen die größten Herausforderungen im Pflanzenbau?
7%
Pflanzenkrankheiten
83%
7%
Bodenschutz
80%
23%
Wasserverbrauch
56%
27%
Vorgabeneinhaltung
49%
kaum relevant
neutral
sehr relevant
Wahrnehmung der Relevanz einzelner Herausforderungen
unter den Befragungsteilnehmern in Prozent (Ausschnitt)


10
smartAKIS
Abhängigkeiten der Anwendung von Smart Farming Tools
Non-adopter
Adopters
90
80
70
60
50
40
30
20
10
0
12
1
42
20
32
24
20
14
14
24
1
17
28
< 2 ha
2-10 ha
11-50 ha
51-100 ha
101-200 ha
201-500 ha
> 500 ha


12
smartAKIS
Priorisierung von Smart Farming Technologien
Aufgeschlüsselt nach Produktionssystemen und Ländern
Priorisierung von Smart Farming Technologien
aufgeschlüsselt nach Produktionssystemen und Ländern
Anzahl Landwirte
Acker-bau
Gemüse-anbau
Obst-anbau
Wein-anbau
Frank-reich
Deutsch-land
Griechen-land
Serbien
Spanien
Nieder-lande
Groß-britannien
Landwirtschafts Apps
Roboter, autonome Maschinen
GPS, variable Ausbringungstechnologie, permanente Fahrgassensysteme etc.
Drohnen, Kartierung, Luftaufnahmen
Wetter und Bodenfeuchtesensoren mit automatischem Datenupload


Smart Farming Tools sind...
Nicht einverstanden
einverstanden
Sinnvoll für die Landwirtschaft
Besser als vorhergehende Lösungen
Verbessern Prozesse
Unterstützen Entscheidungen
Verbessern Arbeitsbedingungen
Erhöhen die Produktivität
Reduzieren Inputkosten
Reduzieren Emmissionen
Verbessern das Einkommen
Verbessern Einfüsse in die Natur
Percentage
Response
Strongly disagree
Disagree
Unsure
Agree
Strongly agree


HEMMNISSE UND HANDLUNGSBEDARF
Kosten und Kompatibilität sind die meist genannten Hemmnisse für die Nutzung von SFT.


4. Der Workshop selbst.


10:20 Uhr
Kurzvorstellung von Smart Farming Tools von Unternehmen aus verschiedenen Bereichen. Angefragt werden u.a.:
- agra2b GmbH
- FarmFacts GmbH
- Fritzmeier Umwelttechnik GmbH & Co. KG
- Vantage ES GmbH
- Zunhammer GmbH
- 365FarmNet GmbH
- FarmBörse GmbH

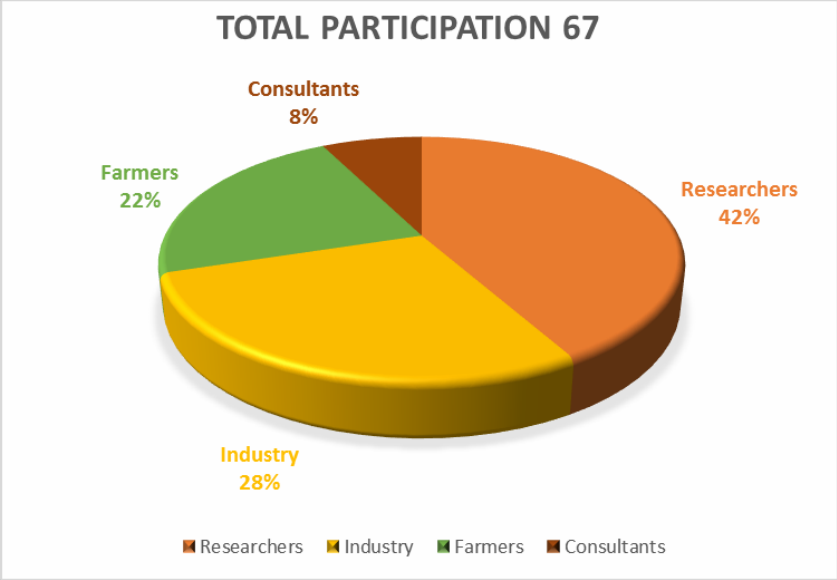

13:30 Uhr
Diskussion in Arbeitsgruppen (World-Café)
Beantwortung von Kernfragen sowie offene Diskussion zum jeweiligen Themenbereich
I. Welche digitalen Innovationen eignen sich besonders für den Einsatz in kleinstrukturierten Agrarregionen
II. Wo liegt der Mehrwert (Ökonomie, Ökologie, Soziales) der Digitalisierung in kleinstrukturierten Agrarregionen
III. Identifizierung von Akzeptanzhemmnissen der Digitalisierung in kleinstrukturierten Agrarregionen
IV. Politischer Handlungsbedarf bzw. Forschungsbedarf vor dem Hintergrund kleinstrukturierter Agrarregionen

RIW2 Attendance Sheets

67 farmers, providers, scientists and consultancies participated in the RIW2 in Germany.

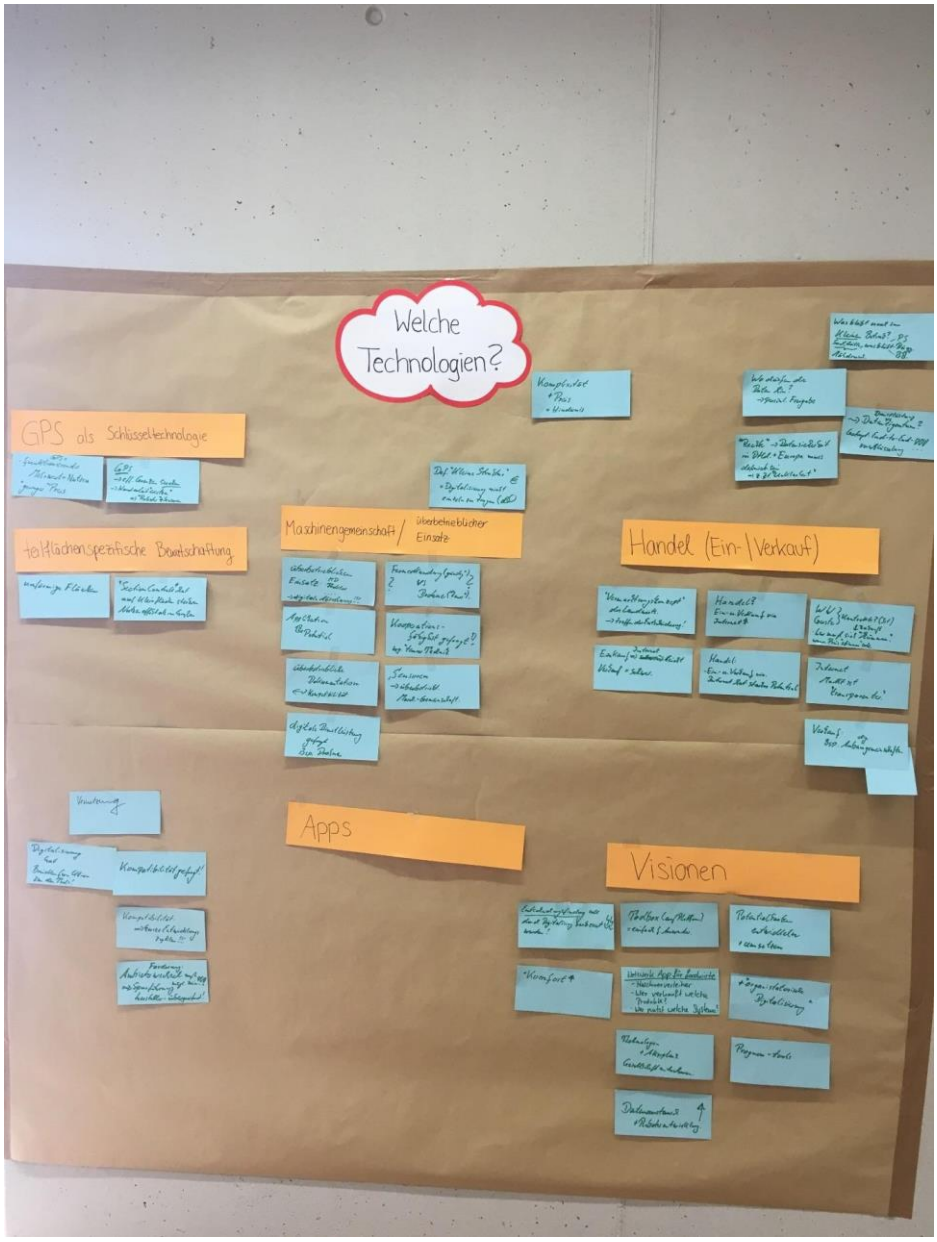
Due to the protection of data privacy the attendance lists will not be published in the report. The project does not have the agreement of all participants to publish names and contact data.

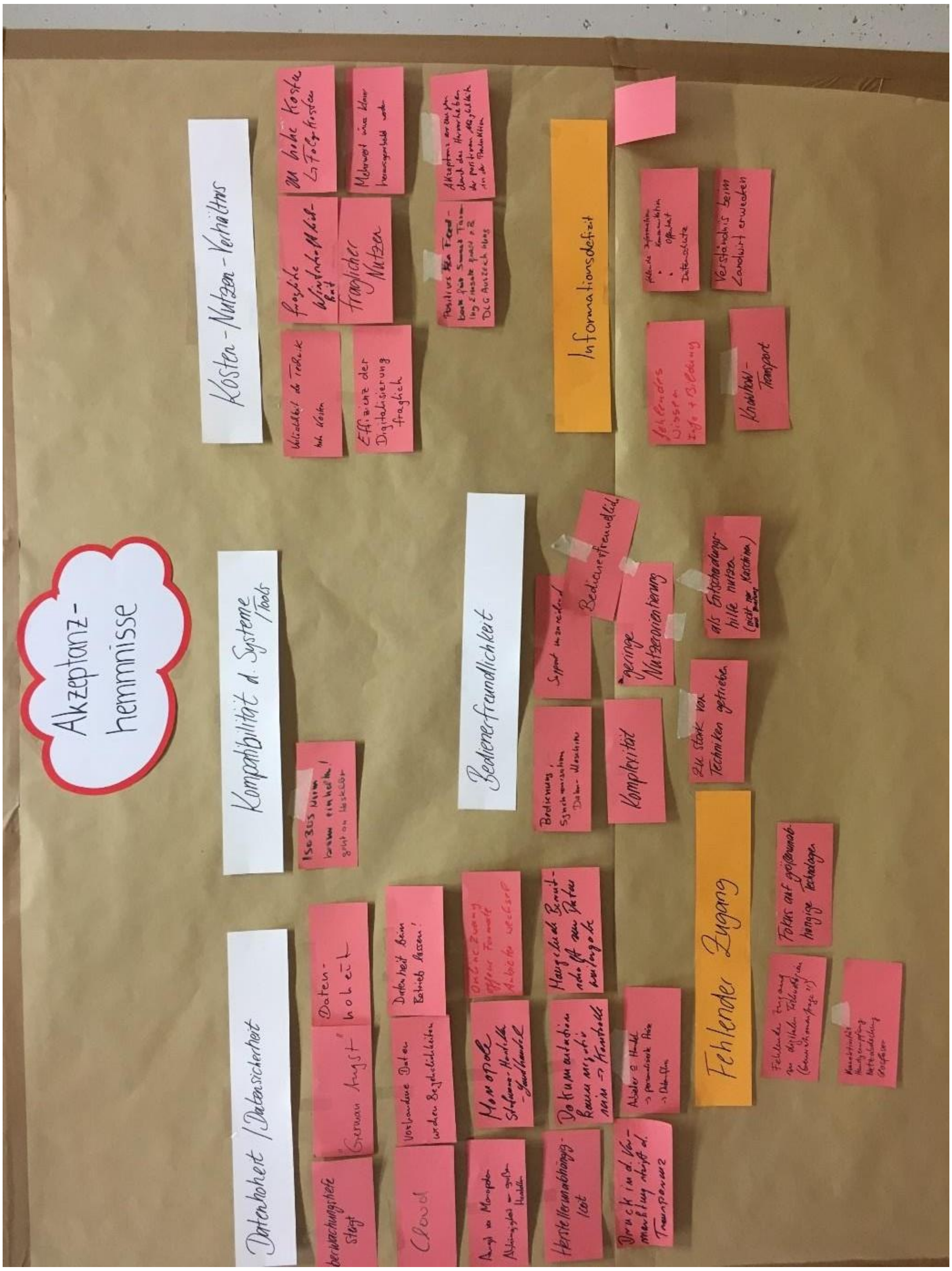
For internal reporting issues, the attendance lists are available from project partner DLG.

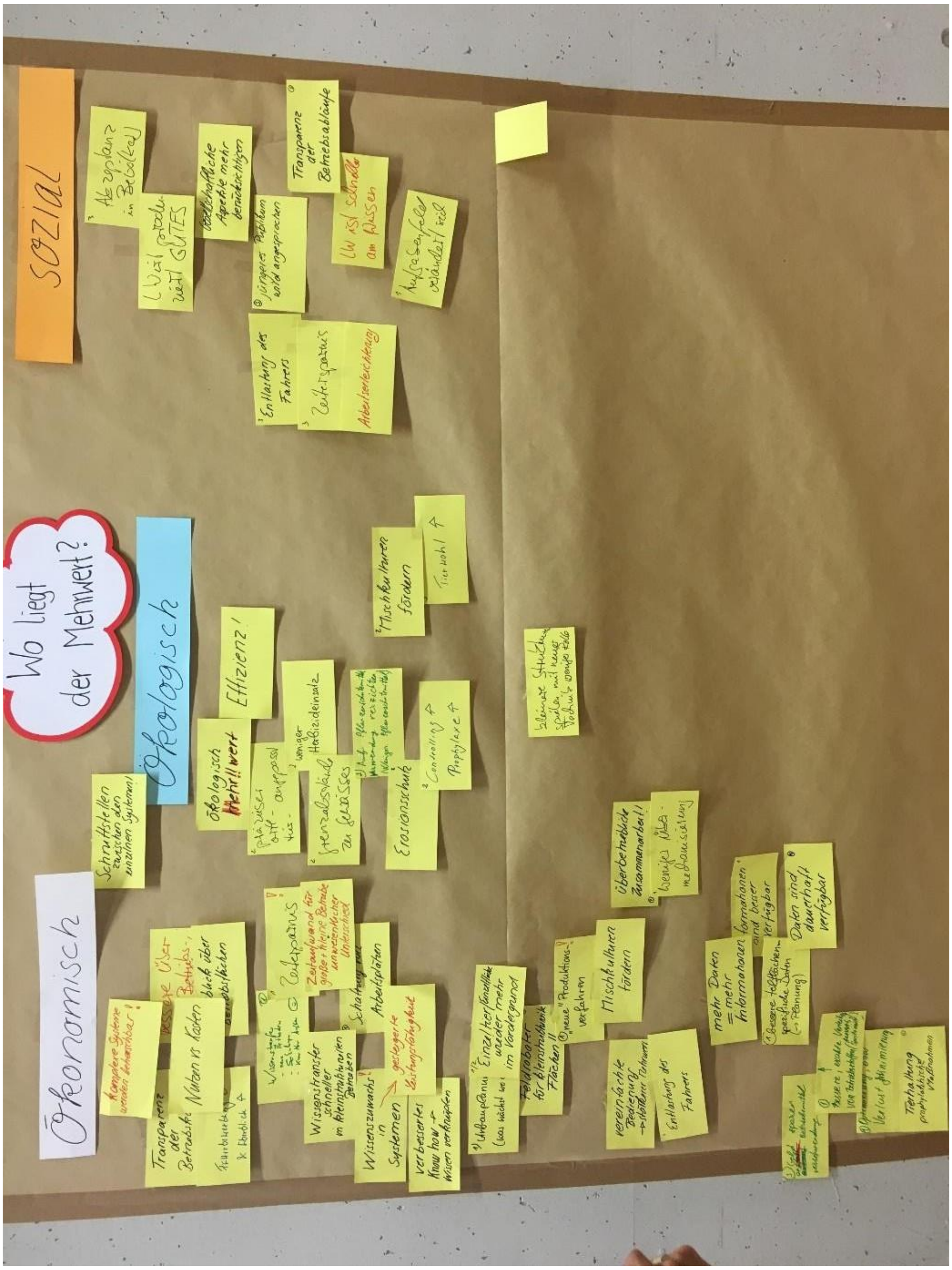


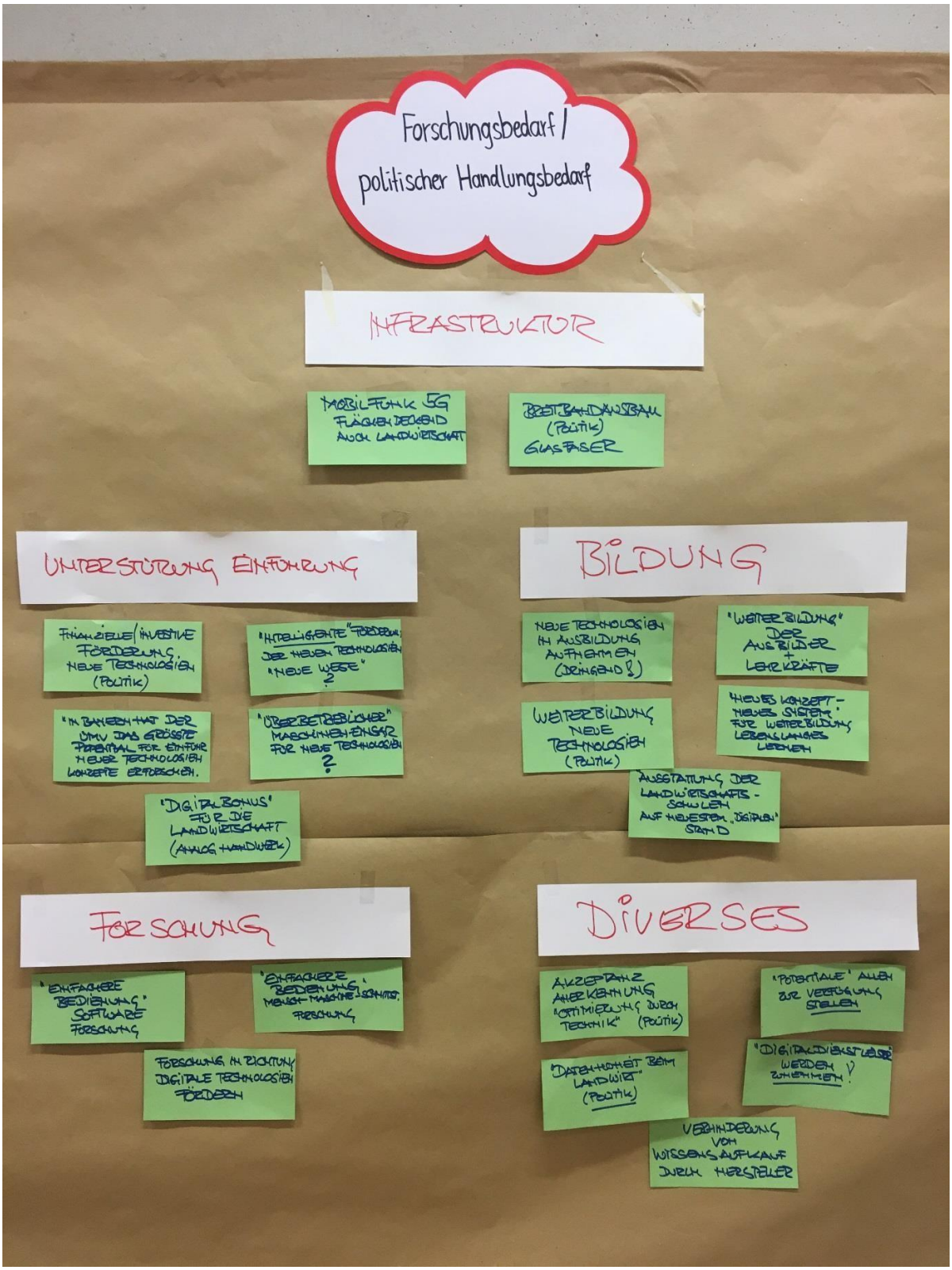
Participants	Number
Researchers	28
Industry	19
Farmers	15
Consultants	5
Total	67

RIW2 Pictures


Welche Technologien?
GPS als Schlüsseltechnologie
Maschinengemeinschaft / überbetriebliche Einsätze
Handel (Ein-/Verkauf)
Apps
Visionen


Akzeptanz-hemmnisse
Kosten-Nutzen-Verhältnis
Fraglicher Nutzen
Kompatibilität d. Systeme/Tools
Bedienerfreundlichkeit
Komplexität
Informationsdefizit
Datenhoheit / Datensicherheit
Daten-hoheit
German Angst
Cloud
Monopol
Fehlender Zugang


Wo liegt der Mehrwert?
Sozial
Ökologisch
Ökonomisch


Forschungsbedarf / politischer Handlungsbedarf
INFRASTRUKTUR
MOBILFUNK 5G FLÄCHENDECKEND AUCH LANDWIRTSCHAFT
BREITBANDAUSBAU (POLITIK) GLASFASER
UNTERSTÜTZUNG EINFÜHRUNG
FINANZIELLE/INVESTIVE FÖRDERUNG NEUE TECHNOLOGIEN (POLITIK)
"INTELLIGENTE" FÖRDERUNG DER NEUEN TECHNOLOGIEN "NEUE WEGE"?
"IN BAYERN HAT DER UMC DAS GRÖSSTE POTENTIAL FÜR EINFÜHRUNG NEUER TECHNOLOGIEN KONZEPTE ERFORSCHEN.
"ÜBERBETRIEBLICHER" MASCHINENRING FÜR NEUE TECHNOLOGIEN?
"DIGITALBONUS" FÜR DIE LANDWIRTSCHAFT (ANALOG HANDWERK)
BILDUNG
NEUE TECHNOLOGIEN IN AUSBILDUNG AUFNEHMEN (DRINGEND!)
"WEITERBILDUNG" DER AUSBILDER + LEHRKRÄFTE
WEITERBILDUNG NEUE TECHNOLOGIEN (POLITIK)
NEUES KONZEPT - NEUES SYSTEM FÜR WEITERBILDUNG LEBENSLANGES LERNEN
AUSSTATTUNG DER LANDWIRTSCHAFTS-SCHULEN AUF NEUESTEM "DIGITAL" STAND
FORSCHUNG
"EINFACHERE BEDIENUNG" SOFTWARE FORSCHUNG
"EINFACHERE BEDIENUNG" MENSCH MASCHINE SCHNITTSTELLE FORSCHUNG
FORSCHUNG IN RICHTUNG DIGITALE TECHNOLOGIEN FÖRDERN
DIVERSES
AKZEPTANZ ANERKENNUNG "OPTIMIERUNG DURCH TECHNIK" (POLITIK)
"POTENTIALE" ALLEN ZUR VERFÜGUNG STELLEN
"DATENHOHEIT BEIM LANDWIRT" (POLITIK)
"DIGITALDIKTAT" WERDEN VERHINDERN!
VERHINDERUNG VON WISSENSABFLUSS DURCH HERSTELLER

RIW2 Findings

Discussion of the needs and ideas identified on WP2

For the 2nd Regional Workshop in Germany, the Bavarian State Research Center for Agriculture as well as the DLG invited a mixed group of farmers, scientists and consultants to learn about the newest developments and research results regarding Smart Farming technologies. Compared to the 1st regional workshop in Germany, this time the focus was on small scaled farms, which are usual found in the southern parts of Germany.

Before all invited companies were invited to introduce their newest Smart Farming Technologies (SFTs), the main results of WP2 farmer interviews were presented to build up a common basis of understanding for the needs of famers regarding new tools.

Many of the findings of WP2 could be verified and even supplemented during the exchange in the discussion groups and in general during the entire workshop day. The added value of SFTs, obstacles to overcome as well as political interferences were discussed in the different workgroups.

Relevance of SFTs regarding needs and ideas identified in WP2

The SFTs selected for the RIW2 in Germany were chosen to be relevant in three fields of plant production: digital farming and business support, plant nutrition, and crop protection.

Farmers are entrepreneurs so they have to rely on dealing with their produced commodities to keep their revenues.

Digital tools may help to gain fair prices or find a suitable market partner for the products produced in the farm.

With the new German fertilizer ordinance becoming effective by June 2, farmers need tools to improve nutrient management. Especially the use of nitrogen and phosphorus is strongly regulated and restricted by the new ordinance. Therefore, the knowledge of crop status, soil nutrient contents, and application control needs to be improved. Parallel to that, the extent of documentation is increasing thus digital reporting systems are highly desired. The introduced tools ranged from improved application planning through mineral and organic fertilizer application. The broad range of SFTs in this subject promised fruitful discussions with the stakeholders.

Which digital innovations are suited particularly for the input in small-scaled agricultural areas?

GPS as key-technology

- well functioning tool
- good cost-benefit relationship

site specific farming

- unshapely fields
- "section control" has a higher usability in small scaled farming

machinery co-operatives

- inter-farm cooperations followed by digital billing of services
- remote sensing (satellite) versus drone application (more expensive)
- cooperatives due to high machine costs
- cooperatives in documentation (difficulties is data compatibility)
- "digital" services not yet much available

trading

- supporting trading concepts for farmers
- online business for farmers (easier for buying inputs than for selling outputs)
- strong potential due to broad online market information (transparent market)
- "digital" producer organization (better exchange of information and logistics)

visions

- improved decision support by digital tools (not yet fully accomplished)
- easy to use for farmers (often still too complex)
- acceptance of new tools also in the society (versus industrial agriculture)

Where does the added value (economy, ecology, social) of the digitalisation in small-scaled agricultural areas lie?

economy:

- complex systems become controllable
- transparency of farm internal costs
- faster knowledge transfer to smaller scaled farms
- increased performance of smaller farms
- field robots for small sites could be more efficient
- new production systems (mixed cropping systems, contour cropping,)
- facilitate farm cooperatives
- improved input efficiency

ecology:

- locally adapted management of farm inputs (fertilizer, seed, plant protection)

- better protection of ecological valuable areas (nature reserves, open water)
- decreased input of chemicals by increased efficiency
- improved cropping systems by introduction of new crops, mixed-cropping, contour cropping…

social:

- acceptance in the society (of farming and new technology)
- relief of farmers/drivers of machines by supporting tools
- time saving (work life balance)
- more interesting for junior staff in agriculture
- better knowledge transfer

Identification from obstacles of acceptance of the digitalisation in small-scaled agricultural areas?

data security / data sovereignty:

- "depth of surveillance" increases
- "German-Fear" (typical conservative)
- new data followed by new business models (not yet foreseeable)
- fear of monopolism of only few data-managers
- higher official requirements with higher transparency

user friendliness:

- synchronising machine data easily
- high complexity with improved systems
- low operator convenience
- "technology first – user second"
- for decision support (at the moment a lot machine control)

input – benefit – relationship:

- low reliability of technology
- high investments
- profit for the farmer not yet clear
- high subsequent costs
- missing clear communication of added values

deficit of information:

- lack of information and education
- lack of communication
- lack of know how transfer
- increasing the perception by farmers

Political need for action or need for research against the background of small-scaled agricultural areas

infrastructure:

- mobile connectivity (5G) nationwide also for farmers
- broad band expansion in rural areas

support of adaption:

- state subsidy for new technologies
- “intelligent” financial support (new ways for subsidies)
- farm cooperatives for adaption of new technologies
- “digital bonus” for agriculture

education:

- integrating new technologies in education!
- train the trainer in new technologies
- improved systems for lifelong learning
- newest equipment in colleges and universities

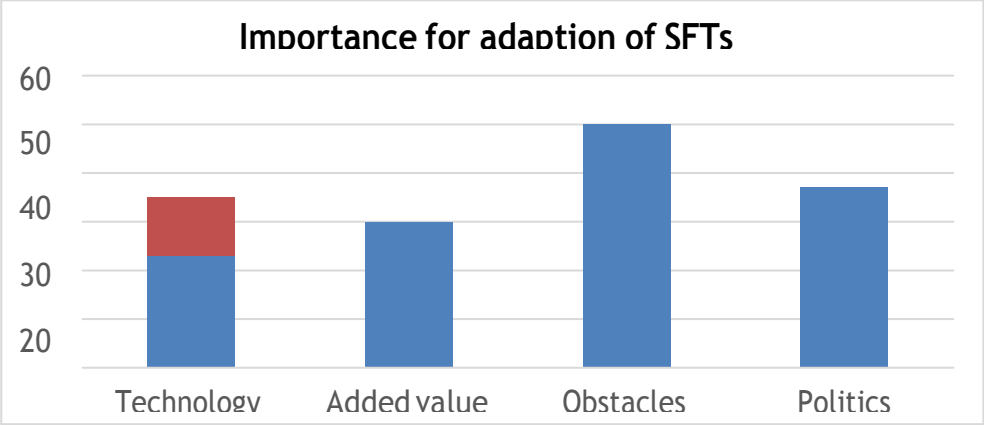
research:

- easy to use of software (new fields of research)
- increased independent research for SFTs
- neutral evaluation of SFTs

Summing up the results of 4 working groups

After the working group and final discussion we asked all participants to rate the importance of the four questions regarding their importance for introducing SFTs in practical farming. Therefore, every participant got 3 stickers to put it onto the section rated most important.

Following distribution was to be observed after analysing the numbers (not representative).



Withing the chapter of “which technology for small-structured regions?” we decided to split the number into two steps of evaluation. First (the blue part), 23 points were counted for the importance of additional and further developed technology. Second (the red part), 12 points were given for the GPS-technology to be the key technology for further introduction of SFTs in

practical farming. As GPS is already a well adapted and accepted technology, we exclude it from evaluating the importance of the four chapters.

Out of that, we see that the “obstacles” mentioined above are the most important aspect to work on when introducing SFTs. Second, the part of politics and research play an important role when SFTs should be introduced in agriculture. Third place, the added values of SFTs seem to be in focus by the participants of this workshop.

If these results prove to be consistent also in other regions it means that the technology itself is not the reason why farmers hesitate in adopting SFTs in their processes.

The group was convinced that only a few deficites avoid SFTs from adaption:

1. data security / data soveregnity
2. user friendliness
3. input-benefit-relationship
4. deficit of information

Most of these aspects could be adressed by better communication with the farmer. A clear statement about data management and security could asure farmers to trust the provider. Developing user friendly systems needs to comunicate with potential users during the building up the systems. Benefits must be comunicated more clearly and/or approved by independent institutions as to make them relyable. Finaly, the lack of information in education as well as in consultancy makes it even more dificult adopting new tools.

If farmers understand the real benefit of SFTs they would most probaly use them without much scepticism. At the moment, the complicated systems with missing compatibility to different systems in the market avoid the necessary flexibility farmers need in their processes. In order to spread risks farmers traditionally do not trust in single systems. They learned to keep up a diversity in their processes to flexibly react upon upcoming difficulties. They seldom trust only one branch of production, grow several crops for different markets and use different brands as to optimize their systems.

In combination with missing neutral research results ending up in useful consultancy it might be a big obstacle for SFTs used by farmers.

This is additionally fuled by the lack of education in universities and technical colleges which should be the basis for a successful use in practical farming. At the moment, technology is overturning education, policy and adaptability of farmers.

If SFTs are accepted in politics this would have an influence on governmental based education, consultancy and support of SFTs in farming. Farmers are missing this acceptance by the government and additionally by the society. With statements like “industrial farming” farmers avoid communicating the use of high tech in their system. Farmers request the positive communication of SFTs used in farming.

Higher costs of investment for SFTs could be overcome by machine cooperatives or improved market access supported by SFTs themselves. Additionally, all farmers found sufficient advantags for ecology and social aspects that we can understand that the scepticism is fueld by different aspects in this subject.

Finally, it must be stated that the SFT itself – the pure idea and technology – is not the reason of missing adoption in pracitcal farming. With clear communication to and with the users and a sound basis of education and acceptance by the policies in first place a further adaption of SFTs in farming could be reached.

RIW2 Evaluation

During the workshop 33 (57 % of participants) evaluation sheets were filled. Their remarks and ratings are incorporated in the following evaluations. They are separated into groups of farmers, industry, researchers and consultants.

Farmers (20 out of 33)

Interest	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How was your overall impression of the workshop?	8	12		

Organisation	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How do you evaluate the organization of the workshop?				
Programm	9	11		
Registration	14	4	1	
Location	14	6		
Catering	14	4	1	
Improvements:				

Methodology	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied

How was the methodology of the workshop?				
Presentations	12	6	2	
Documents	2	13	2	
Speakers	5	15		
Improvements:	Speakers quality was variable.			

	Yes	No
Did you already use SFTs?	19	1

	Yes	No
May you use the introduced technology in future?	19	

Projects	Very high	High	low	Not important
How would you evaluate the importance of the introduced technologies?	5	15		
Please give us the 3 most important tools introduced				
1. Zunhammer, NIR-analysing system for manure				

	Yes	No
Did you already use the Smart AKIS inventory?	3	17

	Yes	No
Will you use the Smart AKIS inventory in future?	17	3

Providers (6 out of 33)

Interest	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How was your overall impression of the workshop?	2	4		

Organisation	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How do you evaluate the organization of the workshop?				
Programm	4	1	1	
Registration	2	2	1	
Location	3	3		
Catering	3	3		
Improvements:	adding animal husbandry			

Methodology	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How was the methodology of the workshop?				
Presentations		5	1	
Documents		5	1	
Speakers		5	1	
Improvements:	Longer discussions, smaller groups instead of presentations			

	Yes	No
Did you already use SFTs?	6	

	Yes	No
May you use the introduced technology in future?	6	

Projects	Very high	High	low	Not important
How would you evaluate the importance of the introduced technologies?	3	3		
Please give us the 3 most important tools introduced				
1. Zunhammer, NIR-analysing system for manure (2) 2. Online trading plattform,				

	Yes	No
Did you already use the Smart AKIS inventory?		6

	Yes	No
Will you use the Smart AKIS inventory in future?	4	2

Scientists (4 out of 33)

Interest	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How was your overall impression of the workshop?	1	3		

Organisation	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied

How do you evaluate the organization of the workshop?				
Programm	2	2		
Registration	4			
Location	3	1		
Catering	2	2		
Improvements:				

Methodology	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How was the methodology of the workshop?				
Presentations	2	2		
Documents		2	1	
Speakers	1	3		
Improvements:				

	Yes	No
Did you already use SFTs?	2	1

	Yes	No
May you use the introduced technology in future?	3	

Projects	Very high	High	low	Not important
How would you evaluate the importance of the introduced technologies?	2	1		

Please give us the 3 most important tools introduced
1. machine cooperation 2. Zunhammer NIRS analysis of manure

	Yes	No
Did you already use the Smart AKIS inventory?	1	2

	Yes	No
Will you use the Smart AKIS inventory in future?	2	

Consultants (2 out of 33)

Interest	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How was your overall impression of the workshop?	1	1		

Organisation	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied
How do you evaluate the organization of the workshop?				
Programm	1	1		
Registration	2			
Location	2			
Catering	2			
Improvements:	Titel is partly misunderstanding. it could be understood that small structures may be worse than large structures.			

Methodology	More than satisfied	Fully satisfied	Not yet satisfied	Not at all satisfied

How was the methodology of the workshop?				
Presentations	1	1		
Documents	1	1		
Speakers		2		
Improvements:	Variability in the speakers quality			

	Yes	No
Did you already use SFTs?	2	

	Yes	No
May you use the introduced technology in future?	2	

Projects	Very high	High	low	Not important
How would you evaluate the importance of the introduced technologies?		2		
Please give us the 3 most important tools introduced				
1.Fritzmeier, fertilizing sensor system 2.Zunhammer, NIRS analysis for manure				

	Yes	No
Did you already use the Smart AKIS inventory?		2

	Ja	Nein
Will you use the Smart AKIS inventory in future?	2	

5.1.3. RIW3

SMART AKIS 3nd REGIONAL INNOVATION WORKSHOP

6. March 2018, Leipzig

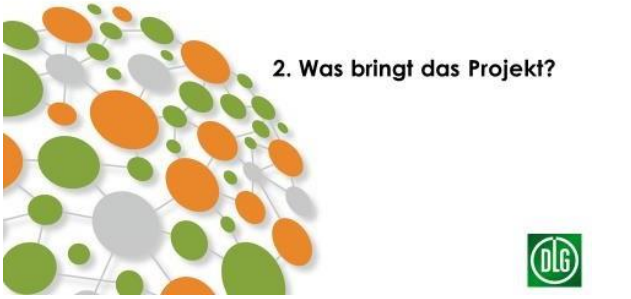
RIW3 Program

Third Regional Innovation Workshop Germany, 6th March 2018

Program	
10:00 Uhr	Welcome and presentation of the workshop aims *Klaus Erdle, DLG*
10:15 Uhr	Innovators with ideas/products/abilities • Micro sensor network, *Kurt Steffens, ENAS Fraunhofer Institut* • EXATREK *Dietrich Kortenbruck, EXA Computing* • Jörd & Rose *Nico Rose, Smart Farming Services and Products* • ZALF *Johann Bachinger, "Land Use and Governance"*
11:00 Uhr	How science could support innovation processes *Teresa Kraus, ZALF*
11:30 Uhr	Relevant funding institutions and programs • EIP speaker *Michael Kaßner, SMUL Sachsen* • National promotion of innovations by BMEL *Paul Martin Küpper, Referat 313, BLE* • Deutsche Rentenbank *Dr. Klaus Hollenberg, Frankfurt*
12:30 Uhr	Lunch
13:30 Uhr	Open discussion for the exchange of ideas and potential building of project groups. Networking. Reorientation.
15:30 Uhr	Feedback and next steps
16:30 Uhr	End

RIW3 Presentations

Subsequently, the presentation (introduction) of Klaus Erdle, DLG e.V., is provided. The presentations of the companies and institutions will be provided in the digital appendix.

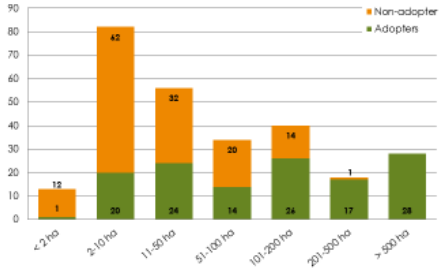


3. Ergebnisse einer Umfrage

Interviews mit Landwirten:

Umfrage mit 271 Landwirten aus 7 Ländern (Frankreich, Deutschland, Griechenland, den Niederlanden, Serbien, Spanien und Großbritannien)

Abhängigkeiten der Anwendung von Smart Farming Tools

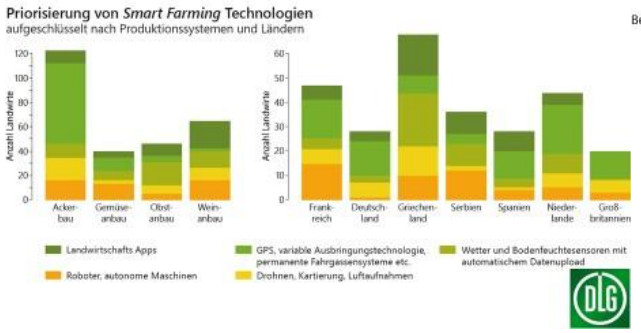


Wo liegen die größten Herausforderungen im Pflanzenbau?

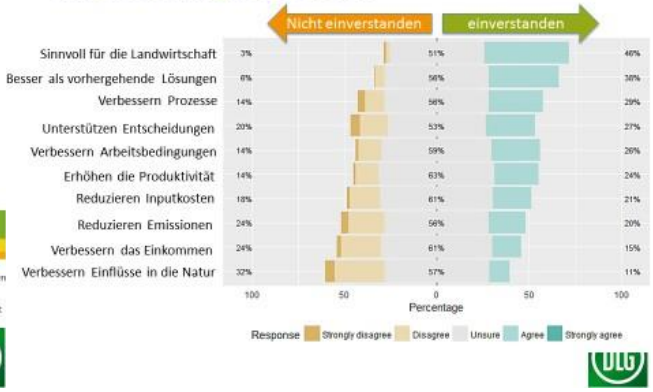
Wahrnehmung der Relevanz einzelner Herausforderungen unter den Befragungsteilnehmern in Prozent (Ausschnitt)

Priorisierung von Smart Farming Technologien

Aufgeschlüsselt nach Produktionssystemen und Ländern



Smart Farming Tools sind…



4. Der Workshop selbst.

Alles kann – nichts muss.

Wie funktionieren Innovationsprozesse?
Welche Erfahrungen haben Sie?
Wo sehen Sie Stellschrauben?
Finden Sie Gleichgesinnte und loten Sie Möglichkeiten aus.

RIW3 Attendance Sheets

9 (+3 from DLG and ZALF) researchers, funding specialists, consultants and start-ups participated in the RIW3 in Germany.

Due to the protection of data privacy, the attendance lists will not be published in the report. The project does not have the agreement of all participants to publish names and contact data.

For internal reporting issues, the attendance lists are available from project partner DLG.

RIW3 Pictures

RIW3 Findings

In RIW3 the focus did not lay on repeatedly confirm the needs of practical farming with the statements of the participants. Moreover, it was aimed to bring together innovators with ideas and abilities and potential funders to support and initiate a potential collaboration around an innovative idea.

This was successfully achieved by the invited participants representing a broad range of innovators (researcher with innovative sensor systems, start-up entrepreneur with smart data- hub, start-up entrepreneur with consultancy abilities and direct contact to practical farming, funding institutions national and federal state based).

All stakeholders agreed that geo data recorded by the public sector should be available for free as to use this information for SFT-uses. Even more, federalism in Germany is a strong barrier because the legal framework changes when crossing the border to another federal state. Many farms own fields in more than one federal state, thus, legal differences may affect the use of SFTs.

RIW3 Project Ideas

Project Idea 1

Category of project	Smart Farming Technology	Crop system
Innovation	*sensor technology*	*Arable Tree Vegetables Vineyards Grasslands*
Promoter/s name/s		
ENAS Fraunhofer Institute		
Partner/s of the proposal and role		
EXA Computing		
Title of project		
Crop pest forecast model based on cheap and biodegradable microsensors		
Expected benefits		
Plant protection is one of the most important topics when it comes to crop management. Forecast models can support decisions for sustainable pest management. Sensors for recording data are costly and depend on service to provide data. Observing crop stand microclimate should be cheap in hardware and management and therefore cover relevant crops and regions to deliver adequate data for pest infection modeling		
Goal and objectives		
➢ Develop cheap and biodegradable micro sensors for microclimate observations. ➢ Develop data receivers to collect sensor data in the field ➢ Provide a data hub for providing data in a model friendly format		
Planned work packages or main activities		
➢ *Adapting microsensors for conditions in the field* ➢ *Developing energy supply for biodegradable sensors.* ➢ *Testing data recording during driving through the crop stand.* ➢ *Discussing the right format for data in the hub.*		

Estimated budget
Not yet estimated
Planned source of funding
Not yet finally identified
Maturity level
To be assessed by Smart AKIS partner
Cross-border potentiality
To be assessed by Smart AKIS partner

5.2. Research needs in Smart Farming

Needs for research from practice (EIP-Agri format)

Title

Developing easy to use interfacec for SFTs

This is the problem (summary in your language)

Die Bedienung von SFTs über Interfaces ist eine Hürde für ihre Nutzung in der praktischen Landwirtschaft.
Derzeit müssen Landwirte und ihre Mitarbeiter für jedes System ausgebildet werden um diese zu verstehen und entsprechend zu nutzen. Komplizierte Menüführung und mehrdeutige Befehle verhindern eine gute Nutzung der Systeme.
Es müssen Interfaces entwickelt werden, die einfach zu verstehen und ohne intensives Training zu nutzen sind.

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

The operation of SFTs through interfaces is still a major obstacle for their use in practical farming.
Farmers and their employees have to be well educated in each single system to understand and use it properly.
Complicated menus and suggestive comands hinder proper and easy use of systems.
Interfaces have to be developed to be easy to understand and to be used without intensive training.

Please briefly explain in English the problem that you are experiencing in practice and which type of research (or knowledge) you need to solve it.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

Interfaces, easy-to-use, SFT

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

Needs for research from practice (EIP-Agri format)

Title

Testing and rating of SFTs

This is the problem (summary in your language)

Derzeit gibt es keine Bewertung der vorhandenen SFTs. Eine neutrale Bewertung über einen festgelegten Methodenkatalog bietet für den Landwirt die Beurteilung der SFTs nach Nutzung, Wert und Vergleichbarkeit mit anderen Systemen.
Objektive Methoden müssen entwickelt werden, um eine Vergleichbarkeit zu gewährleisten.

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

Currently there is no rating of the existing SFTs. A neutral assessment of a set methodology provides the farmer with an assessment of the SFTs for use, value and comparability with other systems.
Objective methods must be developed to ensure comparability.

Please briefly explain in English the problem that you are experiencing in practice and which type of research (or knowledge) you need to solve it.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

SFT, rating, evaluation, method, comparability

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

Needs for research from practice (EIP-Agri format)

Title

Connectivity between Systems

This is the problem (summary in your language)

Aktuell nutzen Landwirte und Lohnunternehmer mehrere Displays für die Bedienung verschiedener Maschinen. Zugmaschinen sind dadurch mit 3-4 Displays ausgestattet, die jeweils die Aufmerksamkeit des Fahrers fordern. Durch die Entwicklung einheitlicher Schnittstellen zwischen den Systemen könnte der Fahrer entlastet und höhere Arbeitssicherheit gewährleistet werden.

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

Currently, farmers and contractors use multiple displays for operating various machines. Tractors are thus equipped with 3-4 displays, each demanding the attention of the driver. By developing uniform interfaces between the systems, the driver could be relieved and higher work safety be ensured.

Please briefly explain in English the problem that you are experiencing in practice and which type of research (or knowledge) you need to solve it.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

SFT, interface, connectivity, work safety

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

Needs for research from practice (EIP-Agri format)

Title

Demonstrate added value from data - utilisation of decision sup

This is the problem (summary in your language)

Die Möglichkeiten zur Verwendung von SFT sind nahezu grenzenlos - in der Theorie. Der tatsächliche Nutzen ist jedoch noch viel diskutiert. Häufig wird hier die noch schwache Aussagekraft der erhobenen Daten zur Entscheidungsfindung im Betrieb angeführt. Die Verbindung von pflanzenbaulichem Fachwissen und der modernen Technologie zur Erzeugung von wertvollen Informationen ist noch unzureichend. Eine weitere Erforschung, z. B. über Szenarienentwicklung unter Einbeziehung aller standortrelevanten Informationen, der Marktpreisentwicklung, aber auch von Ernteeinbußen aufgrund von Unwettern und anderen unvorhersehbaren Ereignissen, kann Systeme mit flexibleren und umfassenderen Entscheidungshilfen ausstatten.

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

The possibilities for using SFT are almost limitless - in theory. The actual benefit, however, is still widely discussed. Often, the still weak informative value of the data collected used for decision-making on the farm is mentioned here. The combination of crop production expertise and modern technology to generate valuable information is still inadequate. Another exploration, e.g. through scenario development including all site-relevant information, market price trends, but also harvest losses due to storms and other unforeseeable events, can provide systems with more flexible and comprehensive decision-making tools.

Please briefly explain in English the problem that you are experiencing in practice and which type of research (or knowledge) you need to solve it.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

decision support systems, scenario development

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

Needs for research from practice (EIP-Agri format)

Title

Adjust SFT to small scale farms

This is the problem (summary in your language)

Die Verwendung von SFT ist zweifelsohne auch für kleine Betriebe lohnenswert, betrachtet man allein die Möglichkeiten bei der Einsparung von Wirkstoffen in Pflanzenschutz und Düngung durch eine teilflächenspezifische Bewirtschaftung. Für viele kleine und klein strukturierte Betriebe gibt es jedoch größere Hürden bei der Anschaffung (z. B. Investitionskosten) und Anwendung (z. B. Flächenstrukturen) der meist auf große Betriebe ausgelegten Technologien. Die Fragen die sich hier u.a. ergeben lauten: Welche Anforderungen an SFT bestehen speziell für kleine und kleinstrukturierte Betriebe? Gibt es eine Möglichkeit die bestehenden Technologien so zu modifizieren, dass sie für kleine Betriebe attraktiver werden? Welche anderen Möglichkeiten bestehen kleine Betriebe an der Digitalisierung teilhaben zu lassen?

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

The use of SFT is undoubtedly also worthwhile for small farms, only considering the possibilities of saving active agents in crop protection and fertilization through site-specific management. For many small and small structured farms, however, there are major hurdles to purchasing (e.g. investment costs) and application (e.g. area structures) to the technologies that are mostly designed for large enterprises. The questions here are i. a.: What requirements for SFT exist especially for small-scaled farms? Is there a way to modify existing technologies to make them more attractive to small farms? What other possibilities do small farms have for participating in digitization?

Please briefly explain in English the problem that you are experiencing in practice and which type of research (or knowledge) you need to solve it.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

Small scaled farms, small farms

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

Needs for research from practice (EIP-Agri format)

Title

Improve data flow and compatibility - research on data formats

This is the problem (summary in your language)

Fehlende Standards bei der Datenaufnahme, -verarbeitung und beim Transfer sorgen für große Probleme beim täglichen Umgang mit digitalen Anwendungen in der Landwirtschaft. Die Kompatibilität verschiedener Hersteller und Geräte ist nicht gewährleistet und die Potenziale der modernen Tools so nicht ansatzweise ausgeschöpft. Der Versuch eines solchen Standards (ISOBUS) war laut vielen Praktikern ein wichtiger und notwendiger Schritt in der Entwicklung, es zeigt sich jedoch, das die gewünschte Vereinheitlichung bis heute nicht stattgefunden hat. Auch beim Datentransfer gibt es großen Forschungs- und Entwicklungsbedarf. Cloudanwendungen sind gegenüber Hardwarelösungen (z. B. USB-Sticks) zu bevorzugen, da sie nicht ortsgebunden sind, bergen jedoch auch viele Risiken (Erreichbarkeit/Offlinefähigkeit, Datenschutz, usw.).

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

A lack of standards in data collection, processing and transfer create major problems in the daily use of digital agricultural applications. The compatibility of various manufacturers and devices is not guaranteed and the potential of modern tools so only rudimentary utilized. The attempt of such a standard (ISOBUS) was according to many practitioners an important and necessary step in the development, it turns out, however, that the desired standardization has not yet taken place. There is also a great need for research and development in data transfer. Cloud applications are preferable to hardware solutions (such as USB sticks) because they are not bound locally, but also carry many risks (accessibility/offline capability, data privacy, etc.).

Please briefly explain in English the problem that you are experiencing in practice and which type of research (or knowledge) you need to solve it.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

data standard, data transfer, data compatibility

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

Needs for research from practice (EIP-Agri format)

Title

Smart farming technologies as an image converter in agricultur

This is the problem (summary in your language)

In der Gesellschaft hat die Landwirtschaft oftmals einen schweren Stand. Die Entfremdung der (städtischen) Bevölkerung von Produktion und Produktionsweisen von Nahrungsmitteln und Energiepflanzen, die für sie lebenswichtig sind, scheint mit der fortschreitenden Modernisierung immer tiefere Gräben zwischen den Akteuren zu schaffen. Smart Farming Technologien könnten im oftmals romantifizierten Bild der Landwirtschaft – kleinflächig, extensiv, mit viel Handarbeit –neben bereits existierenden Vorbehalten gegenüber landwirtschaftlichen Betrieben als weiterer Störer empfunden werden. Andererseits könnte die stetige Weiterentwicklung und Anwendung von Technologien im privaten, wie im wirtschaftlichen Bereich zu einer neuen Selbstverständlichkeit gegenüber Digitalisierung in vielen Lebensbereichen führen. Smart Farming Technologien durch die ein bislang nie gekannter Grad an Transparenz der Produktionsprozesse möglich wird, könnten nicht nur entscheidend dazu beitragen dem vorherrschenden Image der Landwirtschaft einen Realitätscheck entgegenzuhalten, sondern auch Ernährungs- bzw. Konsumgewohnheiten positiv beeinflussen.

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

Agriculture often has a hard time in society. The alienation of the (urban) population from production processes of food and energy crops that are vital to them seems to progress to deeper and deeper divisions between the actors as modernization progresses. In the often romanticized picture of agriculture - small-scale, extensive, with lots of manual work - as well as existing reservations about farms, smart farming technologies could be perceived as further disturbers. On the other hand, the constant development and adoption of technologies in the private as well as in the economic sector could lead to a new self-evidentness towards digitization in many areas of life. Smart farming technologies, which allow a hitherto unknown level of transparency in production processes, could not only make a decisive contribution to countering the prevailing image of agriculture with a reality check but also positively influence food and consumption habits.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

Smart Farming Technologies image agricultural production society

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

Needs for research from practice (EIP-Agri format)

Title

Hands-on assessment of Smart Farming Technologies - Establi

This is the problem (summary in your language)

In Europa scheinen Smart Farming Technologien (SFT) ein Akzeptanzproblem zu haben. Hersteller werben u.a. mit einer Steigerung der Flächenproduktivität bei gleichzeitiger Minderung von negativen Umweltwirkungen für ihre Produkte. Landwirte bleiben jedoch zurückhaltend bei der Investition in SFT. Mitunter laden fehlende Erfahrungswerte und ein Mangel an unabhängigen Informationen zu Kosten und Nutzen derzeit noch nicht zur Nachahmung ein.
Der Aufbau eines Netzwerkes von Demonstrationsbetrieben, auf denen Produkte und Technologien unter Feldbedingungen in Anwendung gebracht werden, bietet eine besonders praxisnahe Möglichkeit SFT unabhängig von ihren Herstellern und nach definierten Kriterien (z.B. Ökonomie, Umweltwirkung, Bedienbarkeit etc.) zu testen und zu vergleichen.

Please briefly explain in your national language the problems you are experiencing in practice and which type of research (or knowledge) you need to solve them.

This is the problem (summary in English)

In Europe, Smart Farming Technologies (SFT) seem to have an acceptance problem. Manufacturers advertise advantages like an increase of productivity while at the same time reducing negative environmental impacts through their products. However, farmers remain reluctant to invest in SFT. Sometimes missing empirical values and a lack of independent information on costs and benefits are hindering factors for the adoption of SFT.
Building a network of demonstration plants where products and technologies are applied under field conditions provides a particularly practical way to test and compare SFT independently of their manufacturers and according to defined criteria (e.g. economy, environmental impact, operability etc.).

Please briefly explain in English the problem that you are experiencing in practice and which type of research (or knowledge) you need to solve it.

Geographical scope

Austria

Please specify the geographical area/s where the need has been identified.

Keywords

Smart Farming Technologies demonstration network field test sites

Agricultural sectors

- None -

Choose the sectors your issue is relevant for (max.5 selections).

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added

5.3. Project ideas Research needs in Smart Farming

Create Project ideas

Title (native language)

Vorhersage von Krankheitsbefall mit Unterstützung von günsti

Title (in English)

Crop pest forecast model based on cheap and biodegradable r

Description

Pflanzenschutz ist eines der wichtigsten Themen beim Pflanzenmanagement. Prognosemodelle können Entscheidungen für eine nachhaltige Schädlingsbekämpfung unterstützen. Sensoren zum Aufzeichnen von Daten sind kostspielig und abhängig vom Service, um Daten bereitzustellen. Die Beobachtung des Mikroklimas in Pflanzenbeständen sollte in Hardware und Management günstig sein und daher relevante Nutzpflanzen und Regionen abdecken, um angemessene Daten für die Schädlingsinfektionsmodellierung zu liefern.

Please provide information in your national language to describe the background of your project (problems to be addressed , objectives, main activities , target groups, innovative elements of this action, expected results).

Description (in English)

Plant protection is one of the most important topics when it comes to crop management. Forecast models can support decisions for sustainable pest management. Sensors for recording data are costly and depend on service to provide data. Observing crop stand microclimate shoud be cheap in hardware and management and therefore cover relevant crops and regions to deliver adequate data for pest infection modelling.

Please provide information in English to describe the background of your project (problems to be addressed, objectives, main activities, target groups, innovative elements of this action, expected results.

Project coordinator is searching for…

- Adapting microsensors for conditions in the field
- Developing energy supply for biodegradable sensors.
- Testing data recording during driving through the crop stand.
- Discussing the right format for data in the hub.

Provide information on what you are looking for (for example, specific expertise, partner in a specific location).

Geographical scope

Austria

Please specify the geographical area(s) where the project will (would) be implemented.

Keywords

forecast, model, economic, biodegradable, microsensor

Agricultural sectors

- None -

Choose the sectors the project is relevant for (max.5 selections).

Proposing person or organization

Fraunhofer Institut for Electronic Nano Systems ENAS, Chemnitz, Germany

Include the name and address of the person or organization that proposes the project idea.

Contact E-mail

Steffen.Kurth@enas.fraunhofer.de

Please provide the e-mail of a contact person for the project.

Expected starting date of the project

Month Day Year

Expected duration

36

Please provide the expected duration of the project in months.

Additional information

Please provide here any other relevant information concerning your initiative.

Attachments

When necessary, auxiliary files can be added using this link.

5.4. Project ideas from workshops

smartAKIS
Smart Farming Thematic Network

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