



WP4 – End-to-end Operational System Assessment

D4.3 Catalogue of EO and Agri service systems and components (Web Portal) v2

Deliverable Lead: Atos France

Deliverable due date: 31/10/2020

Actual submission date: 02/11/2020

Version 1.3



Document Control Page

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Title	D4.3 Catalogue of EO and Agri service systems and components (Web Portal) v2
Creator	ATOS FR
Description	This document reports on activities undertaken so far and planned for the next period related to the Catalogue of EO and Agri service systems and components (data base & Web portal).
Publisher	EO4AGRI Consortium
Contributors	L. Clergue (Atos FR), F; Mallet (Atos FR), M. Egger (EOX)
Creation date	15/10/2019
Type	Text
Language	en-GB
Rights	Copyright "EO4AGRI Consortium"
Audience	<input checked="" type="checkbox"/> Public <input type="checkbox"/> Confidential <input type="checkbox"/> Classified
Status	<input type="checkbox"/> In Progress <input type="checkbox"/> For Review <input type="checkbox"/> For Approval <input checked="" type="checkbox"/> Approved

Revision History			
Version	Date	Modified by	Comments
0.1	16.10.2019	EOX	Document created; Chapters 3 and 4 drafted; Annexes 1 and 2 added
0.9	20.10.2019	ATOS FR	Document Addings for all parts
1.0	29.10.2019	Miguel Angel Esbri (ATOS ES)	Final QA
1.1	02.10.2020	ATOS FR	Update content
1.2	20.10.2020	EOX	Update Content
1.3	02.11.2020	Miguel Angel Esbri (ATOS)	Final QA

Disclaimer

This document is issued within the frame and for the purpose of the EO4AGRI project. This project has received funding from the European Union's Horizon2020 Framework Programme under Grant Agreement No. 821940. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the European Commission.

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Glossary

The glossary of terms used in this deliverable can be found in the public document “EO4AGRI_Glossary.pdf” available at: http://www.eo4agri.eu/EO4AGRI_Glossary.pdf

Definitions, Abbreviations and Acronyms

Table 1: List of Abbreviations and Acronyms

Abbreviation / acronym	Definition
Agri-App	Agricultural Applications
EC	European Commission
Dx.y	Deliverable number y belonging to WP x
WP	Work Package
DIAS	Data and Information Application Services

EO4AGRI Project Overview

The main objective of EO4AGRI is to catalyze the evolution of the European capacity for improving operational agriculture monitoring from local to global levels based on information derived from Copernicus satellite observation data and through exploitation of associated geospatial and socio-economic information services.

EO4AGRI assists the implementation of the EU Common Agricultural Policy (CAP) with special attention to the CAP2020 reform, to requirements of Paying Agencies, and for the Integrated Administration and Control System (IACS) processes. EO4AGRI works with farmers, farmer associations and agro-food industry on specifications of data-driven farming services with focus on increasing the utilization of EC investments into Copernicus Data and Information Services (DIAS).

EO4AGRI addresses global food security challenges coordinated within the G20 Global Agricultural Monitoring initiative (GEOGLAM) capitalizing on Copernicus Open. EO4AGRI assesses information about land-use and agricultural service needs and offers to financial investors and insurances and the potential added value of fuelling those services with Copernicus information.

The EO4AGRI team consists of 11 organizations, complementary in their roles and expertise, covering a good part of the value-chain with a significant relevant networking capital as documented in numerous project affiliations and the formal support declarations collected for EO4AGRI. All partners show large records of activities either in Copernicus RTD, governmental functions, or downstream service operations. The Coordinator of EO4AGRI is a major industrial player with proven capacities to lead H2020 projects.

The EO4AGRI project methodology is a combination of community building; service gap analysis; technology watch; strategic research agenda design and policy recommendations; dissemination (including organization of hackathons).

Executive Summary

Task 4.2 “System Watch and Cataloguing” has been initiated with the definition of a catalogue model and database tables, allowing to load structured descriptions of components within the end to end system.

Given this model, the catalogue has been filled during a continuous System Watch activity, i.e. a survey of systems which are operational today and conceived/planned.

The catalogue was prepared to be made publicly accessible directly via the catalogue.eo4agri.eu Website or indirectly through the EO4AGRI.eu portal or Mundi DIAS as a reference to which systems have been reviewed by the EO4AGRI project and which categorization has been applied to them for their roles and service functionalities. The catalogue will also serve as a directory, or a “who is who” of the stakeholders behind the implementations and respective intentions behind the service offers.

1 Introduction

EO4AGRI decided for conceptual reasons to split the catalogue model in three branches and to also use three different implementations:

1. **Agricultural Services Catalogue:** Description of services which have a certain level of maturity and operability. These descriptions, or service metadata, are being loaded into a Web Catalogue hosted on a DIAS platform called Mundi and referenced by the EO4AGRI.eu website, thereby ensuring a proven operational multi-media hosting platform with categorization and searching functionality and also with an already established popularity in the user community. Furthermore, the synergy of joint promotion with the DIAS provider is beneficial. Finally, the hosting decision will make sure that the contributed information will persist beyond the lifetime of the EO4AGRI project
2. **Pilot4CAP List of Initiatives:** This is a directory and list of structured descriptions of pilot initiatives related in one or the other way with the CAP2020+ reform. Per definition, the information is volatile as pilot projects start and have an end, eventually will lead to an operational service which is then to be considered in the Agricultural Service Catalogue (item 1. above). The Pilot4CAP list has been initiated by the EU DG JRC Unit 5 upon request by Member States who wish to exchange this kind of information among the relevant stakeholders. An online database is being maintained by the JRC. It has been agreed with JRC that EO4AGRI provides help in keeping this database up to date and to enlarge it, as adequate. Also, it is ensured that the Pilot4CAP database will continue to be maintained by the JRC after the project end of EO4AGRI. Unfortunately, and due to the meagre response from the stakeholder community, only a few new entries could be gathered, and a few updates of existing entries could be achieved. Eventually this activity was suspended and focus was rather put on the compilation of Agri-Apps information as described in the following.
3. **List of Agri-Apps:** This has been the attempt to gain an overview of the “zoo” of start-up initiatives, at different stages of development. Due to the dynamic nature of the information a dynamic Web portal solution has been implemented. In a first step, a text document was provided and maintained with frequently updated structured descriptions of Agri-Apps to be included in the EO4AGRI report deliverable. After receiving the agreement for publishing by the Agri-App developers this information collection was also added to the online Agricultural Service Catalogue described above.

1.1 Purpose of the document

The goal of this document is to present technical objectives of the catalogue in order to develop it efficiently. In addition, also it presents the architecture and the content elements.

1.2 Relation to other project work

The task 4.2 and the present deliverable represent the consolidation of the activities carried out in WP3 and WP4.

1.3 Structure of the document

This document is structured in 3 major chapters

- **Chapter 2** presents approach and status of the **EO4AGRI Agricultural Services Catalogue**.
- **Chapter 3** presents approach and status of the **Pilot4CAP List of Initiatives**

- **Chapter 4** presents approach and status of the **List of Agri-Apps** with detailed information on each stakeholder.
- **Chapter 5** presents the **conclusions**

2 Agricultural Services Catalogue

This chapter describes the activities carried out so far for preparation of the Web information pages and content management system for the provisioning of descriptions of agricultural services identified by the EO4AGRI team.

The purpose of the Catalogue is to provide data information in Agriculture domain, where there is already a huge quantity of services distributed by many platforms and services.

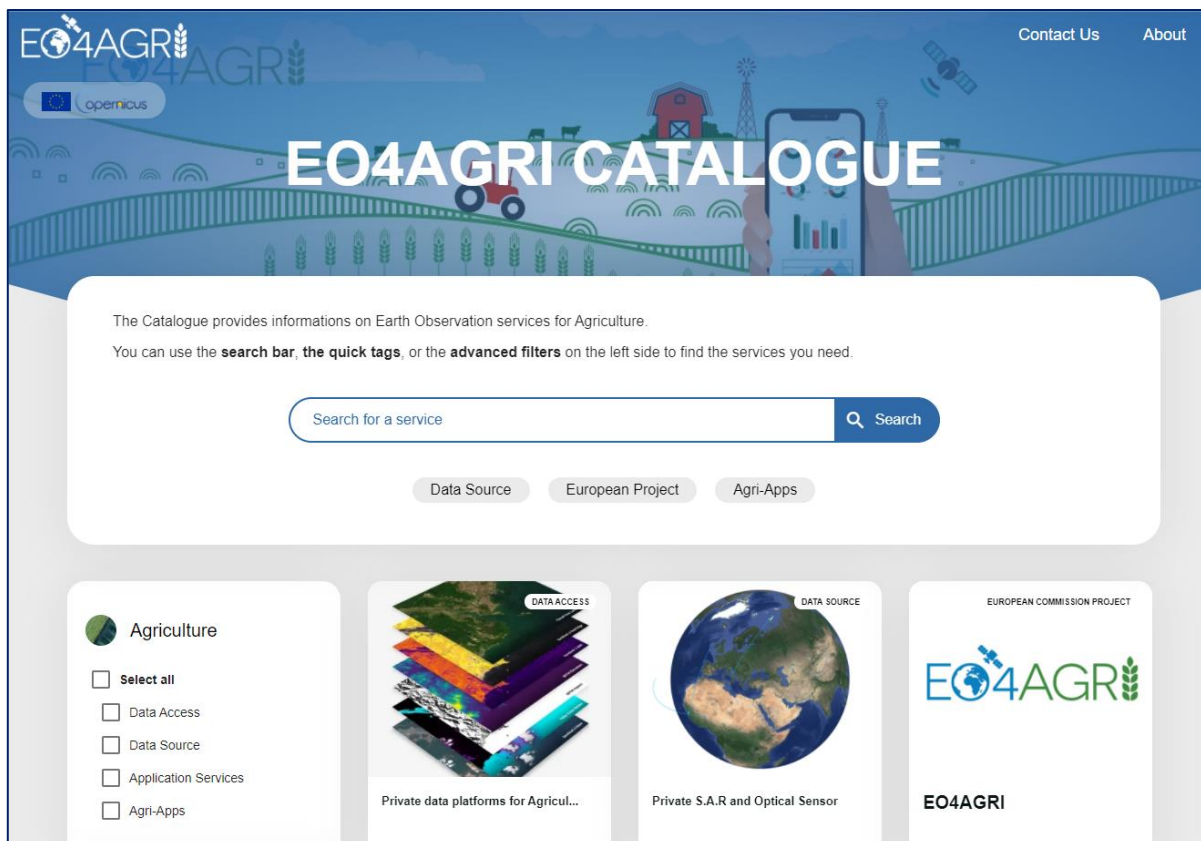
To organize access to data, a breakdown structure of the main Data blocks has been identified in deliverable D4.1 “Overall Architectural Model from Copernicus Components to specific Agri-Apps”.

The description of the catalogue will follow this architecture with the 4 main building blocks: DATA SOURCE, DATA ACCESS, APPLICATION SERVICES and AGRI-APPS.

The catalogue will be made publicly accessible via a Web site to which systems have been reviewed by EO4AGRI and which categorization has been applied to them for their roles and service functionalities. The catalogue also will serve as a directory of the stakeholders behind the implementations and respective intentions through the service offers.

2.1 Requirements and implementation for the EO4AGRI Catalogue

The EO4AGRI web Catalogue is hosted on the actual Mundi platform hosted by Atos. It will re-use the same MarketPlace layout as MundiWebServices but with its own breakdown structure and with a graphical theme related to the main EO4AGRI.eu web site.



2.1.1 Requirements for the Catalogue

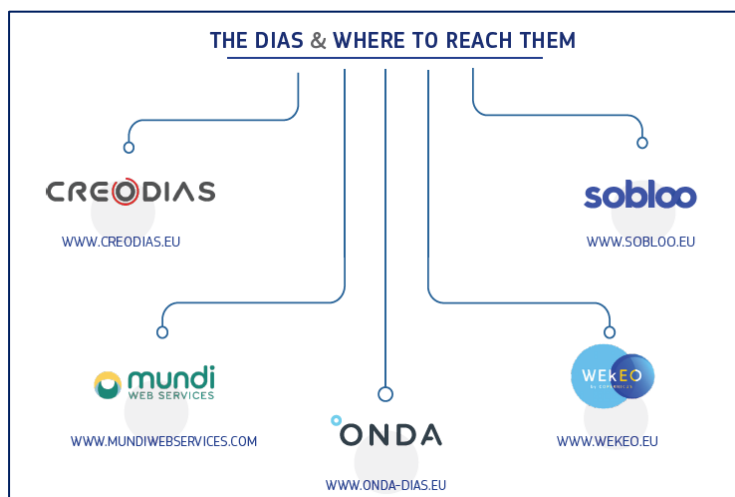
- Provide access to:
 - o Multiple data platforms where data are hosted
 - o Many actors and stakeholders in the Earth Observation domain for Agriculture
- Give functionality to:
 - o View information by categories, structured as agriculture end to end system
 - o Search by specific keyword
 - o Search by specific tag
- Public easy access to the Catalogue thru:
 - o the EO4AGRI.eu web site (<https://eo4agri.eu/>),
 - o the Mundi Marketplace (<https://mundiwebservices.com/service/eo4agri>),
 - o any search engine in the web
- Referenced by the existing DIAS Mundi MarketPlace is a nice to have:
 - o Hosting by a proven operational platform
 - o Join synergy promotion with this provider
 - o Ensure sustainable contributed information
- Responsive website for tablet and smartphone

2.1.2 Breakdown Structure of the EO4AGRI Catalogue

The architecture presented in deliverable D4.1 describes the main building blocks characterizing the current end-to-end systems in the agriculture domain. In accordance to that, the catalogue will follow a similar structure:

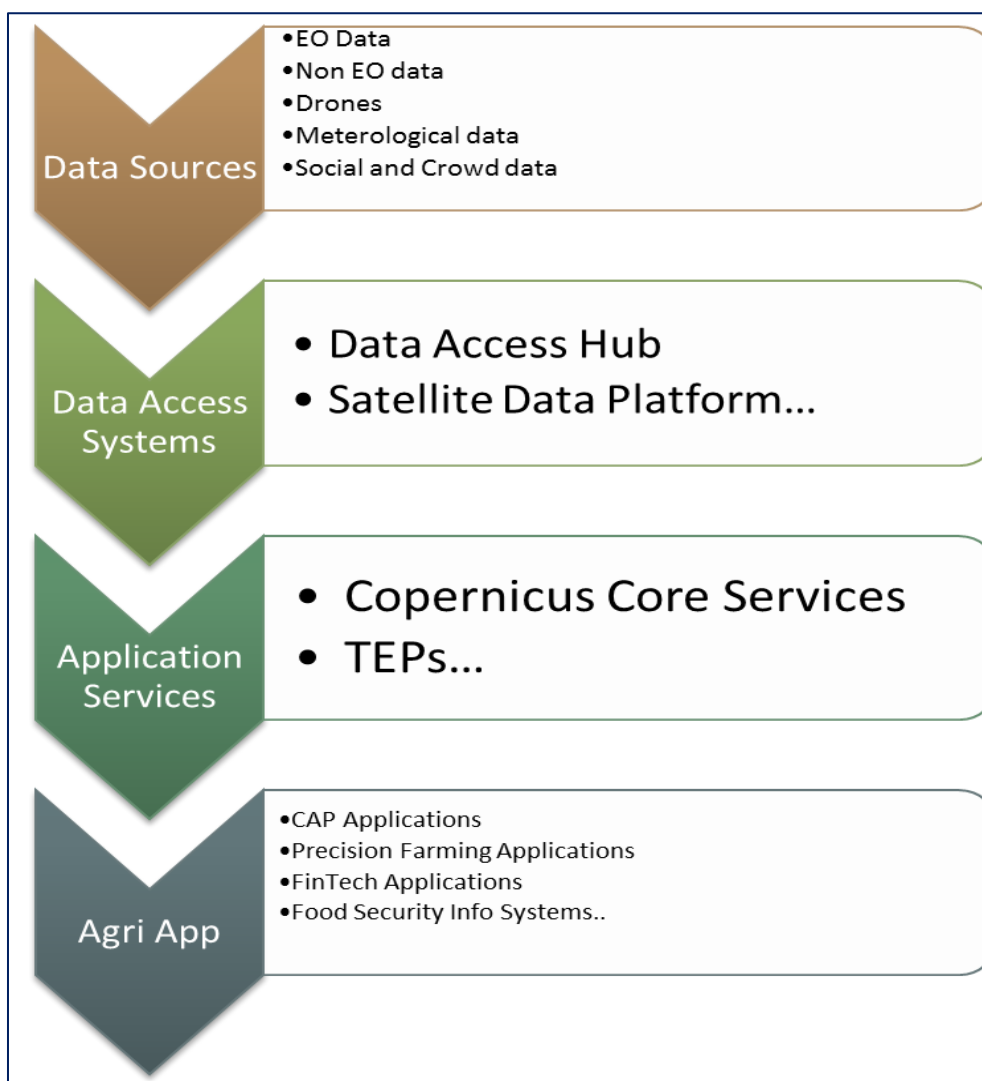
- **DATA SOURCE**
 - o Private SAR and Optical Sensor:
 - Synthetic Aperture Radar
 - ALOS-2,
 - Radarsat-2,
 - TerraSAR-X,
 - ...
 - Optical Sensor
 - EnMAP,
 - Prisma,
 - Spot6-7,
 - ...
 - o Each Sentinel-X satellite

- **DATA ACCESS**
 - o DIAS
 - Mundi, ONDA, Sobloo, CreoDias and Wekeo



- CONVENTIONNAL DATA ACCESS HUBS
 - DATA HUB (ESA, SCI Hub, Sentinel HUB, EUMETSAT, CODA ...)
 - Services DATA and Information (Mundi)
- SATELLITE DATA PLATFORMS
 - Digital Globe GBDX
 - Planet Platform
 - One Atlas ...
- OTHER DATA ACCESS PUBLIC INITIATIVES
 - THEIA Land Data Centre
 - ESA Thematic Exploitation Platforms
 - NOA Hellenic National Sentinel Data Mirror Site ...
- PRIVATE INITIATIVES
 - AWS (Sentinel-2)
 - Google Earth Engine
 - Euro Data Cube ...
- **APPLICATION SERVICES**
 - Copernicus Core Service Systems
 - Copernicus Land Services
 - Copernicus Marine
 - Copernicus Atmosphere Monitoring Service
- **AGRI-APPS: More than 40 start-ups powering the future of agri-business**
 - Farm Management Software (Farmdok, AEGRO ..)
 - Precision Agriculture and Predictive analytics
 - Sensors
 - Animal Data
 - Robotics and Drones
 - Smart Irrigation

- NextGen Farms
- Marketplaces
-

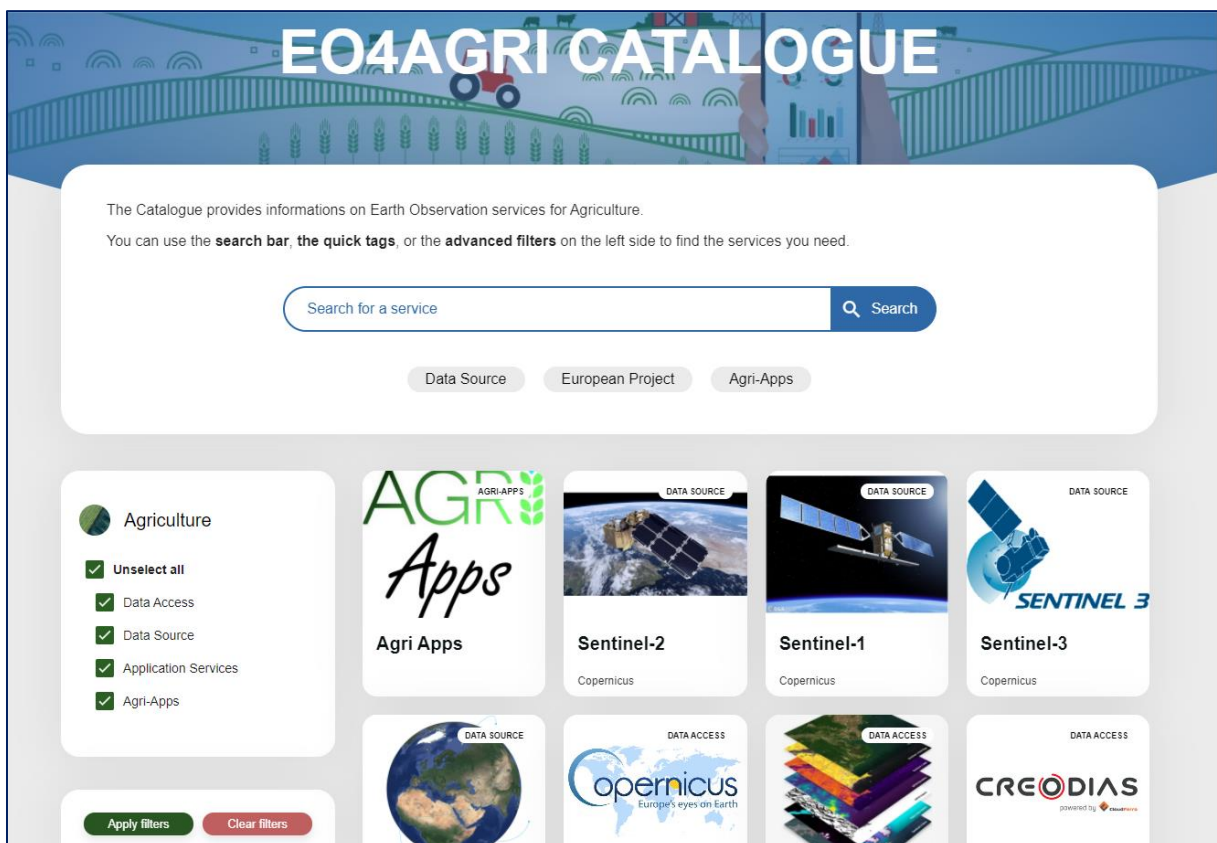


Implementation of the EO4AGRI Catalogue Web Site

The EO4AGRI catalogue is a public website (<https://catalogue.eo4agri.eu>) hosted on Mundi technical platforms. It has been developed with AngularJS for front-end and KeystoneJS (MongoDB) for the back-end.

The user interface was inspired by the existing Mundi Market Place web page but with the EO4AGRI graphic chart, its own data and categories.

- The Homepage:



- The Footer Section:



2.1.2.1 Functionalities behavior of the EO4AGRI Catalogue

- The Catalogue is displayed as a gallery of Platforms/Actors/Services which are searchable and sortable by category. Each clickable tile provides detail information of the selected service :

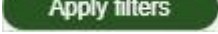


2.1.2.2 View information by category

At the left of the page, the Agriculture tree propose a list of categories to select functional group of elements.

Those categories follow the structure define in the D4.1 for the value chain definition. The main components of the end-to-end agriculture system are:

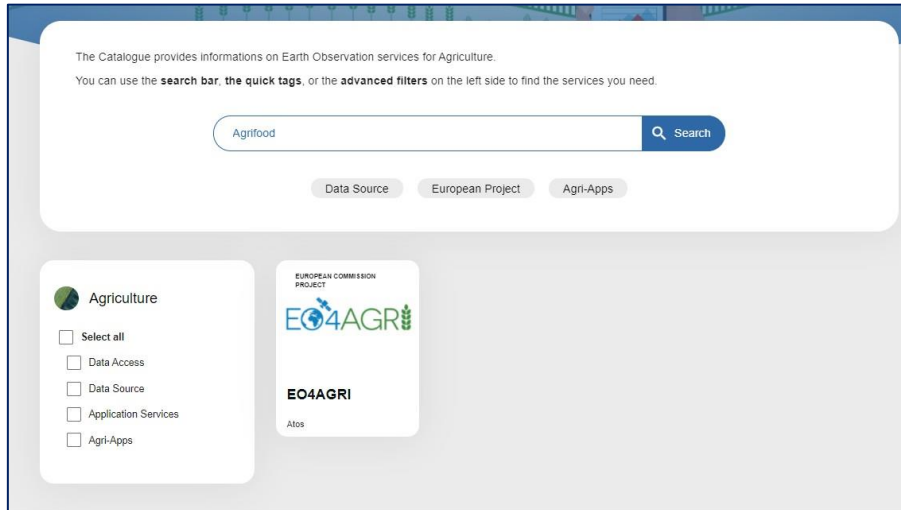
- Data Source
- Data Access
- Application Services
- Agri-Apps

After you have selected the categories in the tree, you have to click to the  button to get the result.

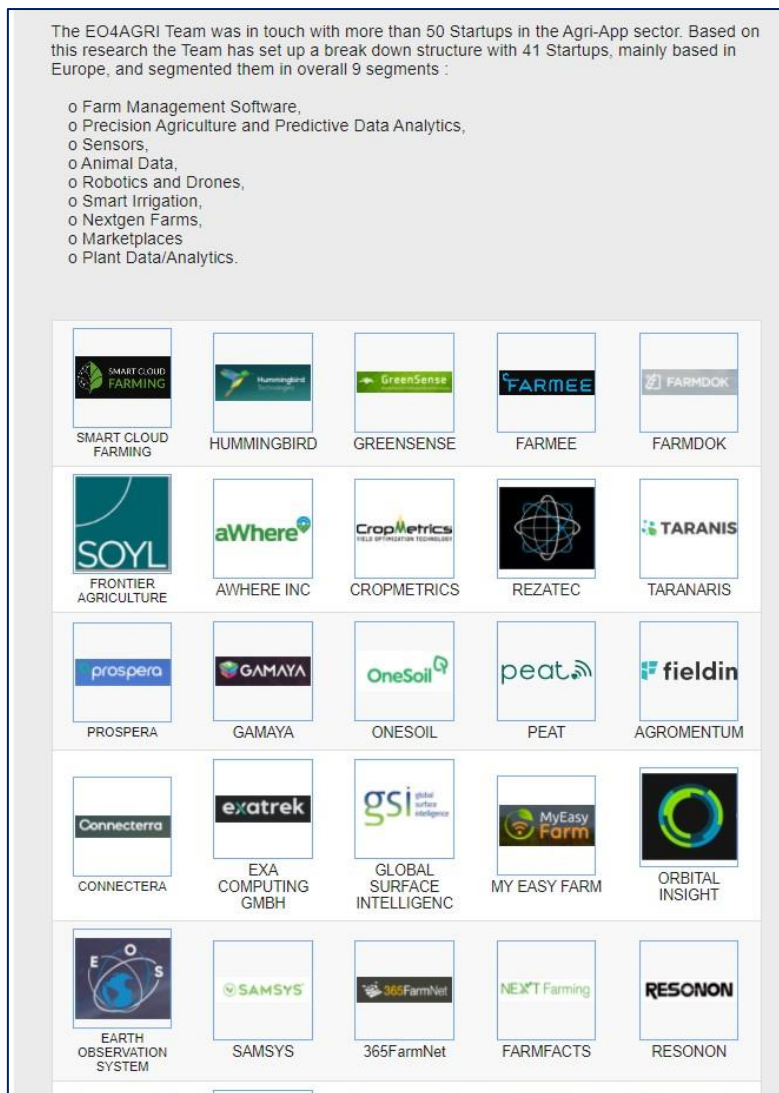
2.1.2.3 Search by specific keyword

On the text editor of the search bar, user can also search a stakeholder with specific keyword related to the name or to an element of the description of the service.

For example, if you search for “Agrifood”, it will display the EO4AGRI tile in the result:



Or if you search for a specific Agri-Apps application such as “Onesoil”, the Agri-Apps tile which contains Agri-Apps applications will be displayed. This tile shows a list of Agri-Apps:

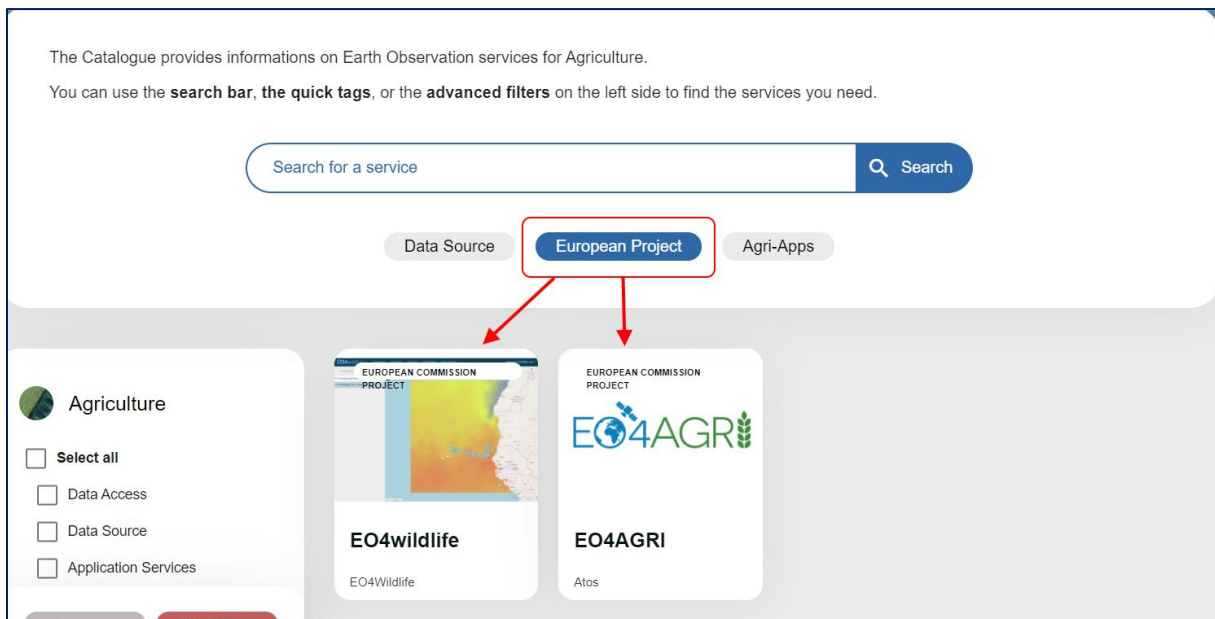


2.1.2.4 Search by specific tag

Each service can be “tagged” with one or several keywords to be find more easily.

For example, the tiles EO4AGRI and EO4WildLife has been tagged with “European Project” Keyword.

This tag has been added under the search bar module and when it’s selected, color of the tag turns to blue:



NB: to administrate the tag functionality (add new tag, linked tag to service, display tag in the search bar ...), we use KeystoneJS configuration.

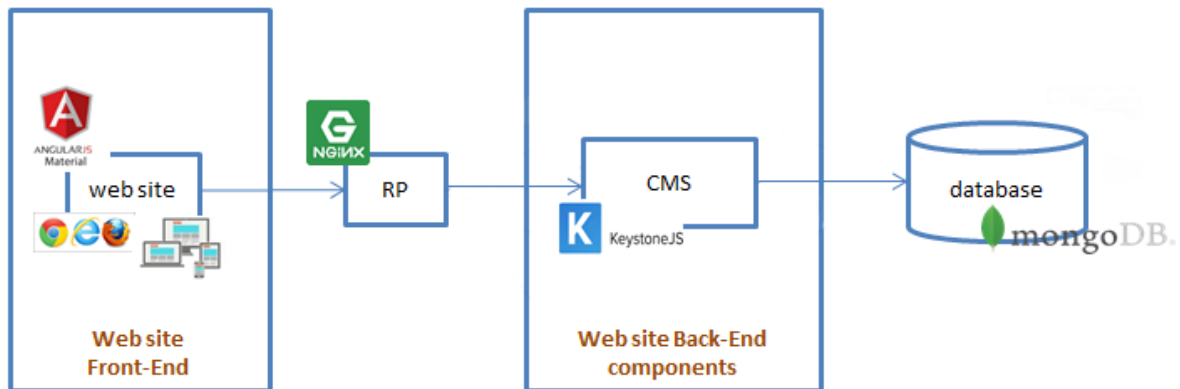
2.1.2.5 Clean filters

At any time, you can reset the filter done to the displayed data (search, tag selection or categories filter) by clicking on the **Clear filters** button.

Notice that we cannot cumulate filters: each time a new filter/search/tag is apply, it removes the previous filter which has been done.

2.1.3 Technical Architecture

The following figure presents the components of the EO4AGRI Catalogue web site.



Without entering many details (components are detailed later in the document), the components of the website are the followings:

Front-end component:

- The Website itself: it's SPA (single page application) implemented with AngularJS

Back-end components:

- A CMS (Content Management System): Its role is to manage the content of the Website. It's based on keystone.js open source product. The CMS stores its data in a Mongo database.

Other components: The following component is not really website components, but rather infrastructure components. Nevertheless, it is mentioned here as it is integrated with the website.

- Nginx: act as a Reverse Proxy: manage URL "routes" to the several backend components.

2.1.3.1 Components description

2.1.3.1.1 Website

The website is a single page application based on **AngularJS**. It uses **Angular-Material** to easily follow Material Design specifications and is developed in **EcmaScript 6**. This language choice requires babel and webpack to transpile code into browser supported Javascript.

The dependencies versioning is automatically managed by npm to avoid any major version change that may impact the software functionalities. Furthermore, any change to versions will be visible in the Gitlab commits history.

2.1.3.1.2 CMS

This web application use a Content Management System (CMS) to create, manage and modify data content of the website.

The content manager used is KeystoneJS. This lightweight Content Management System written in Node.js can be easily improved by adding routes for views and data. We are currently exposing contents from the CMS via a restful service (see /routes/restful_api.js). This service can both manage the security and multilingualism of contents if needed.

The KeystoneJS' documentation is available at <http://keystonejs.com/docs/getting-started/>
Our custom developments and CMS development tips are documented in the CMS project's README.md file.

Note that you can find any npm dependencies documentation by searching the dependency name on <https://www.npmjs.com>.

2.1.3.2 Responsive website

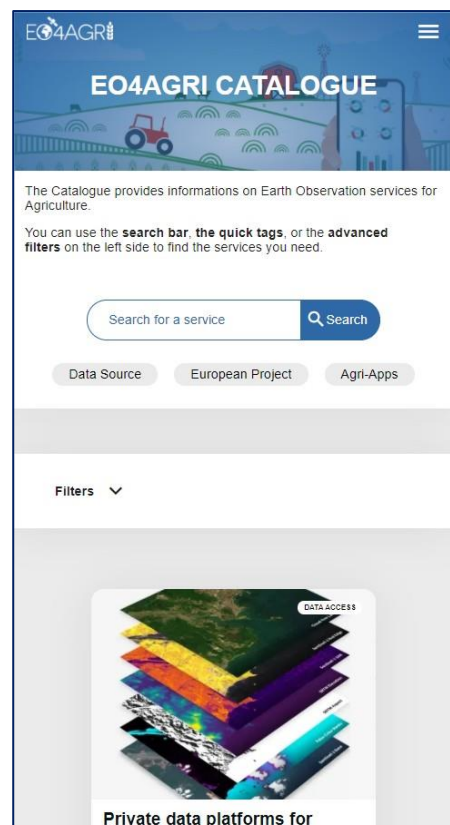
The responsive web design uses Material standard breakpoints to manage small devices : <https://material.angularjs.org/1.1.5/layout/introduction>

This ensures the website has designed views for devices to the minimum 400px width. Most components use only CSS styles to adapt to small screens. In some cases, elements may be duplicated to change the HTML structure depending on the screen size.

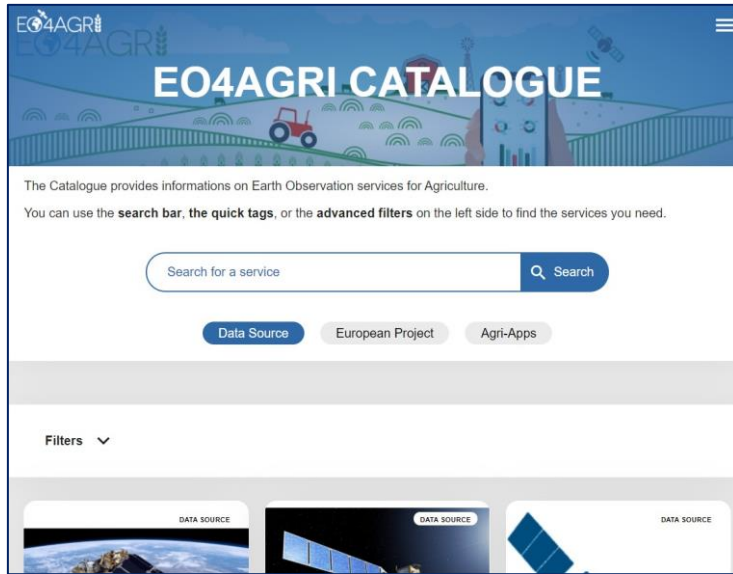
The following browsers have been tested: IE11, Edge, Firefox (57 & 58), Chrome (63 & 64), Safari (10 & 11)

Example of resolution screen:

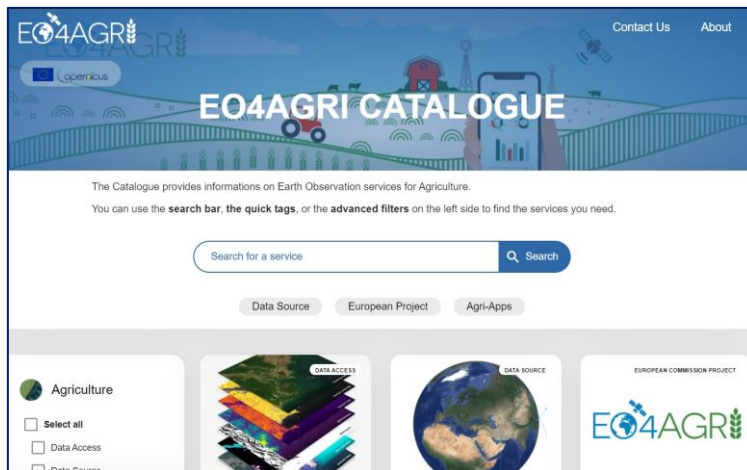
Mobile resolution:



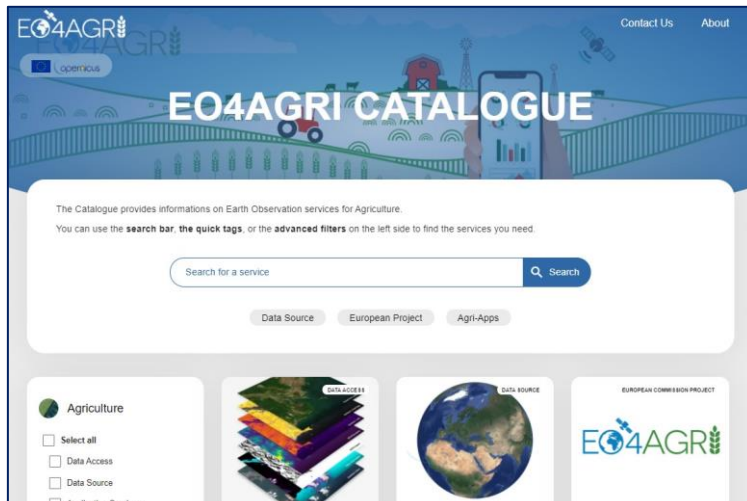
600 px <Resolution < 960 px



960 px <Resolution < 1280 px



Resolution > 1280 px



3 Pilot4CAP List of Initiatives

This chapter describes the activities carried out so far for the preparation of the descriptions of pilot initiatives for implementing the Cap2020+ reforms carried out by the EO4AGRI team in coordination with the DG JRC Unit 5.

Pilot4CAP will be linked with other parts of the catalogue from Mundi DIAS. It will be easy and transparent for users to navigate between both parts.

3.1 Requirements and implemented procedure

The EO4AGRI team has explored a procedure for adding Pilot project information to the Pilot4CAP data base. The first goal is to review whether the existing (some 40) entries in the Pilot4CAP database are up-to-date and to encourage the authors to revise or withdraw their information. The second goal is to add some new 25 to 30 Pilot candidates which are worth to be included. This number may grow.

The EO4AGRI team first studied the Pilot4CAP Web application¹ and then proposed a procedure which allows reviews of “Pilot Descriptions” by “Pilot Owners” prior to going public. Why did the team not simply ask the Pilot Owners to enter themselves their Pilot Descriptions directly into the Pilot4CAP platform? The team expects that more Pilots would be described if most of the form-filling work was done by EO4AGRI. Furthermore, the quality of contributed information could be enhanced w.r.t. to the objectives of Pilot4CAP.

The following describes requirements and the implementation/procedure which was tested and agreed with DG JRC.

3.1.1 Requirements:

1. The EO4AGRI Team shall produce and propose draft Pilot Descriptions in order to lower the effort and entry barrier for Pilot Owners to contribute information to the Pilot4CAP database
2. A mechanism shall be available for reviews of Pilot Descriptions by Pilot Owners before descriptions are getting published on the Pilot4CAP platform (From what we can see no such mechanism is available in the Pilot4CAP platform. If correct, EO4AGRI will follow the procedure described below.)
3. Once agreed with the Pilot Owner, the EO4AGRI Team shall insert the Pilot Description and upload attachment(s), if any, and publish them via the Pilot4CAP platform
4. At later stages, Pilot Owners shall be able to edit/update their Pilot Descriptions, i.e. they must be made owners of their descriptions in the Pilot4CAP platform and get their individual login credentials (This is where G4CAP Operators must be involved. Is this feasible? See below.)

¹ <https://g4cap.jrc.ec.europa.eu/G4CAP/pilot4cap>

3.1.2 Implementation and procedure:

1. Tool Set-up:

The EO4AGRI Team:

- a. Uses the Google Forms tool
- b. Provides a fill-in form design which mimics exactly the information structure and selection choices of the Pilot4CAP platform. Contact information will be treated as designation of the Pilot Owner who will maintain the Pilot Description at later stages.

2. Drafting of Pilot Description (and finding agreement by the Pilot Owner):

The EO4AGRI Team:

- a. Fills-in identified information for the Pilot into the Google form, thereby producing a draft Pilot Description
- b. Identifies reference material suggested to be uploaded as file attachment (< 5 MB)
- c. Sends via email the draft Pilot Description to the prospective Pilot Owner by providing the Google form link (see example link below) and the reference to the suggested attachment(s)
- d. In the same email, invites the prospective Pilot Owner to participate in the Pilot4CAP initiative (explaining the objectives, the EO4AGRI support, the procedure)
- e. Additional email or phone contacts may be required for encouragement, for clarifications, etc.

The Pilot Owner:

- a. Opens the Google form link provided by the EO4AGRI Team
- b. Reviews the information in the form, modifies it, adds information, changes selections, as necessary
- c. Submits the form by pressing the “Send” button at the bottom of the Google form, hereby stating the correctness of the contained information and the agreement for publishing it

3. Publishing of Pilot Description on Pilot4CAP Web application:

The EO4AGRI Team:

- a. Receives the agreed Pilot Description via the Google Forms tool
- b. Copies the Pilot Description into the Pilot4CAP Web application and uploads the attachment(s) using the credentials provided to EO4AGRI and “Saves” them, thereby publishing the information
- c. Informs the G4CAP Operators per email about a new user (Pilot Owner’s name and email address) and which Pilot Description belongs to this user

4. Finishing-off

The G4CAP Operator:

- a. Creates this new user / Pilot Owner
- b. Assigns write access to this user to the associated Pilot Description
- c. Sends an email to EO4AGRI providing the login credentials of the new user

The EO4AGRI Team:

- a. Sends an email to the new user / Pilot Owner informing about successful completion of the publication and providing the login credentials via which the Pilot Description can be maintained from now on
- b. Monitors all Pilot Descriptions during their maintenance by the Pilot Owners (and during EO4AGRI project duration) in order to suggest updates, as applicable.

Example Google Forms link to be sent to Pilot Owner for reviewing Pilot Description (try it out for the provided Pilot example, change something and “Send” it; you cannot damage anything; we may find a way to shorten the link).

<https://shorturl.at/bfhw3>

The introduction to the Google forms questionnaire reads

“Pilot4CAP [<https://g4cap.jrc.ec.europa.eu/G4CAP/pilot4cap>] is a Web platform for sharing monitoring pilot project information. EO4Agri [<https://eo4agri.eu>] is a project supporting the maintenance of the Pilot4CAP database.

Your project’s form was pre-filled by the EO4AGRI Team based on information identified in open publications, presentation slides, Web pages etc.

You are invited to review the provided information, modify, complete or attach document(s), as you feel adequate. By pressing “Send” at the bottom of the form, you authorize publication of your Pilot Description on The Pilot4CAP Web platform.

Thank you in advance for your contributions!”

3.1.3 Information collection and maintenance finally suspended

The EO4AGRI Team has set up a break down structure with the existing 36 Pilot4CAP Projects to be reviewed from the Pilot Owners according to the agreed process. Additionally, EO4Agri drafted Pilot Descriptions for another 17 Projects to lower the entry barrier for the Pilot Owners and extend the existing Pilot4CAP platform (7.1 Annex 1 Pilot4CAP database records).

In spite of quite some effort spent by the EO4AGRI team on contacting Pilot4CAP stakeholders for information gathering, the responses were hard to get, meagre and very tedious to carry further. Only 4 stakeholder initiatives agreed to feedback information, eventually it was just one stakeholder who provided descriptions of a CAP monitoring pilot. Considerations of efficient resource spending in EO4AGRI led to the decision to suspend the information collection exercise.

The status of the Pilot4CAP database can therefore be considered as left to be very outdated and, consequently, gaining a decreasing interest by the community of Payment Agencies (who originally requested from JRC to maintain this means of information exchange database).

4 List of Agri-Apps

This chapter describes the activities carried out so far for preparation of the Web information pages and content management system for the provisioning of descriptions of agricultural services identified by the EO4AGRI team.

4.1 Requirements and implementation approach

The EO4AGRI team first studied the market for Agri-Apps in Europe and abroad. Following the break down structure in D4.1 the team segmented the market for Apps in overall 9 segments. These segments are: Farm Management Software, Precision Agriculture and Predictive Data Analytics, Sensors, Animal Data, Robotics and Drones, Smart Irrigation, Nextgen Farms, Marketplaces and Plant Data/Analytics.

The following describes requirements and the implementation/procedure.

4.1.1 Requirements

1. The EO4AGRI project compiles and analyses information about IT initiatives in agriculture with focus on opportunities brought by satellite monitoring
2. EO4AGRI will further monitor the sector and prepare investment and/or funding recommendations

4.1.2 Implementation and procedure

1. Research on Agri-Apps Sector worldwide
2. Gathering company information based on the existing structure of Pilot4Cap
3. Classification based on 9 segments of Agri-Apps
4. Adding information about the stage and the funding structure of the companies
5. Analyze the information in terms of the additional opportunities brought by satellite monitoring
6. Preparation of invest and funding recommendation

4.1.3 Status of the market analyses

The EO4AGRI Team was in touch with more than 50 Startups in the Agri-App sector. Based on this research the Team has set up a break down structure with 41 Startups mainly based in Europe (7.2. Annex 2 Agri-Apps descriptions). The data collection followed the structure of Pilot4Cap, adding categories of interest like the stage or the funding of the company. EO4AGRI could at least add one Agri-App to every of the 9 segments.

At the next stage EO4AGRI shall review all the collected data and prepare investment and funding recommendations for the Agri-App sector.

5 Conclusions

In its task to provide a catalogue of agricultural service systems connected to a directory, or a “who is who” of the stakeholders behind the implementations and respective intentions behind the service offers, the EO4AGRI project succeeded in defining adequate data structures/models, information gathering processes and sustainable maintenance approaches for the three branches:

1. **Agricultural Services Catalogue:** Description of services which have a certain level of maturity/operationality and which are to be maintained in the EO4AGRI Catalogue
2. **Pilot4CAP List of Initiatives:** Directory of descriptions of pilot initiatives related to the CAP2020+ reform being operated as an online database by the JRC with information gathered and input after a review process by EO4AGRI
3. **List of Agri-Apps** or start-up initiatives, at different stages of development to be included in EO4AGRI report deliverable.

The current report is intermediate as it contains a snapshot of the current implementation of the three branches. In the next phase of the EO4AGRI project the information gathering process will be further ramped up and deliver a consolidated and comprehensive picture of EO and agri service systems and components.

6 References

- [1] https://ec.europa.eu/commission/commissioners/2014-2019/bulg/announcements/speech-commissioner-bulg-drones-conference-warsaw_en

7 Annexes

7.1 Annex 1 Pilot4CAP database records

ItemID	Title	Project description with source	additional sources	Subject
	GIS technology for agricultural resource protection and riskmanagement – GeoCare	Remote sensing is able to capture areal changes in soil properties. The freely accessible Sentinel-data of the European Copernicus program enables the development of a resource-efficient and tax saving method to monitor changes in greenland properties. See https://www.ifl.bayern.de/ipt/gruenland/348995/index.php (retrieved and translated 06.10.2019)		services
	GIS-ELA - Geo Information Systems for the Austrian Agriculture	"Only 6% of the Austrian farmers are using data and GNSS/GPS-based precision farming, which is very popular across the world. Therefore the economic and environmental benefits of precision farming are not being exploited. The project "GIS-ELA" will evaluate the potentials of precision farming technologies for Austria and promote its use." https://ec.europa.eu/projects-practice/gis-ela-geo-information-systems-austrian-agriculture_en (retrieved 06.10.2019)	http://gis-ela.josephinum.at/kartennutzung/	other
	GNSS - Interregional Satellite Positioning Service	"The Interregional GNSS Positioning Service of Regione Piemonte and Regione Lombardia (SPIN GNSS) is an indispensable infrastructure to support satellite measurements directly in the territory, in respect of well known precision and linked to the European Geodetic Reference System ETRF89-ETRF2000." https://www.spingnss.it/spiderweb/fmindex.aspx (retrieved 06.10.2019)		Land cover
	Development and administration of geographic information system (GIS portal)	"The GIS portal represents a single entry point to the spatial data, services and applications available to state institutions. The portal enables state institutions to publish on-line GIS services and applications, thereby enabling the use of their data and services by the general public. The GIS portal uses the GIS infrastructure provided by the State Computer Cloud (DRO), so those institutions that have the right to use the DRO services can publish on the portal." https://www.gov.si/zbirke/projekti-in-programi/razvoj-in-administracija-geografskega-informacijskega-sistema-gis-portala/ (retrieved 06.10.2019)		Land cover
	LIFT Low-input Farming and Territories - Integrating knowledge for improving ecosystem-based farming	"The overall goal of LIFT is to identify the potential benefits of the adoption of ecological farming in the European Union (EU) and to understand how socio-economic and policy factors impact the adoption, performance and sustainability of ecological farming at various scales, from the level of the single farm to that of a territory." https://www.lift-h2020.eu/	https://www.lift-h2020.eu/	services
	ECOLaSS Evolution of Copernicus Land Services based on Sentinel data	"The ECOLaSS project (Evolution of Copernicus Land Services based on Sentinel data) aims to develop methods and algorithms for pre-operational prototypes improving and developing future specific Copernicus Land services. These prototypes, representing new or improved Copernicus Land Cover and Land Use products, will be demonstrated by means of test/demonstration sites distributed over Europe and Africa, representing multiple bio-geographic regions and biomes. Prototypes will be designed with high spatial and thematic accuracy, in a timely manner for a pan-European operational Roll-out with the potential for global applications." https://ecolass.europa.eu/project/rcn/206153/factsheet/en (retrieved 06.10.2019)	https://ecolass.eu/	Land cover
	Bringing Earth Observation Services for Monitoring Dynamic Forest Disturbances to the Users EOMonDis	"The EOMonDis Project aims to improve the operationality of tropical forest products/services in order to better access the funding for the UNFCCC REDD+ policy which is a large market segment for the EO industry in Europe. Additionally, national forest policy programmes and Zero Deforestation programmes also require forest monitoring systems with assessment of forest/non-forest information using disturbance indicators for deforestation and degradation as well as changes in above ground woody biomass. In order to provide operational forest monitoring services for the humid and dry forests several technical challenges have to be overcome." https://ecolass.europa.eu/project/rcn/199830/factsheet/en (retrieved 06.10.2019)	https://www.eomondis.info/	Land cover
	Focus Forest Operational monitoring using Copernicus and UAV hyperspectral data	"FOCUS is a proposed H2020 project aimed at demonstrating an innovative extension of an existing forest monitoring service (www.silvasec.com) using a combination of Copernicus Sentinel 2 imagery with hyperspectral data captured by UAV platforms." https://ecolass.europa.eu/project/rcn/212427/factsheet/en (retrieved 06.10.2019)	http://focus.uc.pt/	Land cover
	NADIRA Nurturing Africa Digital Revolution for Agriculture	"NADIRA aims to incorporate Copernicus, other Earth Observation products and in-situ IoT devices into mAgriTM, an existing value chain orchestration platform connecting, in smallholder contract farming, producers with banks, insurers, input providers and agro-industries to control risks and improve the productivity, security, and welfare of tens of thousands of African farmers." https://ecolass.europa.eu/project/rcn/212436/factsheet/en (retrieved 06.10.2019)	http://nadiraproject.eu/	Land use
	SENSAGRI Sentinels Synergy for Agriculture	"SENSAGRI will exploit the synergy of optical and radar measurements to develop three prototype services capable of near real time operations: (1) surface soil moisture (SSM), (2) green and brown leaf area index (LAI) and (3) crop type mapping. These prototypes shall provide a baseline for advanced services that can boost the competitiveness of the European agro-industrial sector. SENSAGRI proposes four advanced proof-of-concept services: (i) yield/biomass, (ii) tillage change, (iii) irrigation and (iv) advanced crop maps. The algorithms will be developed and validated in four European agricultural test areas in Spain, France, Italy and Poland, which are representative of the European crop diversity, and their usefulness demonstrated in at least two non-European countries." https://ecolass.europa.eu/project/rcn/206330/factsheet/en (retrieved 06.10.2019)	http://sensagri.eu/	Land cover
	ECOPOTENTIAL: improving future ecosystem benefits through earth observation	"Terrestrial and marine ecosystems provide essential services to human societies. Anthropogenic pressures, however, cause serious threat to ecosystems, leading to habitat degradation, increased risk of collapse and loss of ecosystem services. Knowledge-based conservation, management and restoration policies are needed to improve ecosystem benefits in face of increasing pressures. ECOPOTENTIAL makes significant progress beyond the state-of-the-art and creates a unified framework for ecosystem studies and management of protected areas (PA)." https://ecolass.europa.eu/project/rcn/196809/factsheet/en (retrieved 06.10.2019)	https://www.ecopotential-project.eu/	Land cover
	APOLLO Advisory platform for small farms based on earth observation	"The overall objective of APOLLO is to develop a commercial platform that will provide a suite of farm management advisory services specifically designed to address the needs of small farmers. APOLLO will use state-of-the-art methodologies for the calculation of agricultural parameters based on EO data, taking advantage of the improved spatial and temporal coverage of the new Sentinels." https://ecolass.europa.eu/project/rcn/199271/factsheet/en (retrieved 06.10.2019)	http://apollo-h2020.eu/	Land use
	CALCHAS Computational Intelligence for Multi-Source Remote Sensing Data Analytics	"Earth Observation (EO) is undergoing a radical transformation due to the massive volume of observations acquired by remote sensing and in-situ sensor networks. While satellites provide coarse-resolution, yet global-scale monitoring of environmental processes, in-situ sensor networks acquire high-accuracy localized measurements. Extracting information from spaceborne and ground based instruments requires innovative solutions which will allow the autonomous integration of diverse in nature and scale observations in order to provide high-quality geophysical parameter estimation. CALCHAS will demonstrate cutting edge technologies targeting three major factors towards the vision of fully automated multi-source EO data understanding, namely (i) the fusion of observations from different sources and modalities, (ii) the efficient aggregation of the sampling scales associated with spaceborne and in-situ measurements, and (iii) the analysis of time-series of dynamic observations." https://ecolass.europa.eu/project/rcn/222830/factsheet/en (retrieved 06.10.2019)	https://www.forth.gr/	services
	Earth Observation Monitoring and Traffic Lights	NIVA Usecase		Monitoring
	Agri-environmental monitoring	NIVA Usecase		Monitoring
	Farmer performance	NIVA Usecase		Monitoring
	Prefilled applications	NIVA Usecase		Prefilled Application
	Farm Registry	NIVA Usecase		Farm Registry
	Geotagged Photos	NIVA Usecase		Self-Certification
	Machinery Data in GSAA as added value data	NIVA Usecase		Self-Certification
	LPIS Update & Change detection	NIVA Usecase		Seamless Claim
	Scheme Eligibility and Payment Eligibility; Click and Pay	NIVA Usecase		Seamless Claim
	19 An automated SOM clustering based on data topology	Existing Project in Pilot4cap - necessity to review		Other
	20 Artificial intelligence applied to spatial information	Existing Project in Pilot4cap - necessity to review		Land use
	8 Automated Detection of alpine fodder areas (AFA)	Existing Project in Pilot4cap - necessity to review		Land cover
	Automated detection of grassland mowing, arable and abandoned land	Existing Project in Pilot4cap - necessity to review		Land use
	26 Automatic procedures for the identification of changes in the actual use of agricultural land	Existing Project in Pilot4cap - necessity to review		Land use
	CAP monitoring in MALTA (Crop Verification - Tomato VCS & Agric. Activity)	Existing Project in Pilot4cap - necessity to review		LPIS
	36 Conceptualization of the implementation study of the nature conservation app in agricultural and administrative practice	Existing Project in Pilot4cap - necessity to review		OTSC
	21 COPERCAP	Existing Project in Pilot4cap - necessity to review		Land cover
	27 Crop detection/recognition	Existing Project in Pilot4cap - necessity to review		Land cover
	12 Crop Map of England (CROME)	Existing Project in Pilot4cap - necessity to review		Land cover
	Crop monitoring by remote sensing for the selection of risk samples: a pilot experience in northern Aragón (Spain)	Existing Project in Pilot4cap - necessity to review		OTSC
	2 CzechAgri Project	Existing Project in Pilot4cap - necessity to review		Land use
	25 DataBio CAP Support	Existing Project in Pilot4cap - necessity to review		Services
	1	Existing Project in Pilot4cap - necessity to review		Land use
	14 European Forest Downstream Services - Improved	Existing Project in Pilot4cap - necessity to review		Other
	Information on Forest Structure and Damage	Existing Project in Pilot4cap - necessity to review		Land cover
	38 Expertise in the use of Sentinel 1 and 2 imagery to monitor the agricultural activity of the ARMA beneficiaries	Existing Project in Pilot4cap - necessity to review		Land cover
	Geoland2, Core Service: Agri Environmental Indicators Core Information Service (AgriEnv Core Information Services)	Existing Project in Pilot4cap - necessity to review		Other
	22 Grass cover monitoring in olive groves	Existing Project in Pilot4cap - necessity to review		Land use
	10 Grassland mowing detection system	Existing Project in Pilot4cap - necessity to review		Land use
	32 Implementation of monitoring in Andalusia	Existing Project in Pilot4cap - necessity to review		Land use
	30 Irish Permanent Grassland Monitoring	Existing Project in Pilot4cap - necessity to review		Land use
	JRC pilot inventory and monitoring of the 'eligible' land under SAPS in Bulgaria	Existing Project in Pilot4cap - necessity to review		Land cover
	JRC pilot on optimization of HHH time series for annual inventory of the agriculture land at country level	Existing Project in Pilot4cap - necessity to review		Land cover
	11 Main crop detection, support of checks concerning crop diversification	Existing Project in Pilot4cap - necessity to review		Land use
	33 Methodology for monitoring crops in Andalusia	Existing Project in Pilot4cap - necessity to review		Land use
	23 Monitoring winter flooding in rice crop areas	Existing Project in Pilot4cap - necessity to review		Land use
	Neural network-based clustering for agriculture	Existing Project in Pilot4cap - necessity to review		Land use
	18 management	Existing Project in Pilot4cap - necessity to review		Land use
	28 Pilot Monitoring Farmland	Existing Project in Pilot4cap - necessity to review		Land use
	37 POCTEFA PIREN-EOS	Existing Project in Pilot4cap - necessity to review		Land use
	RECAP - Personalised public services in support of the implementation of the CAP	Existing Project in Pilot4cap - necessity to review		Land use
	24 Remote sensing stubble burning detection	Existing Project in Pilot4cap - necessity to review		Land use
	9 SENSACAP	Existing Project in Pilot4cap - necessity to review		Land use
	Small business innovation Research on mutation detection	Existing Project in Pilot4cap - necessity to review		Land use
	29 on LPIS parcels	Existing Project in Pilot4cap - necessity to review		Land use

7.2 Annex 2 Agri-Apps descriptions

Company/Product	State	Segment	Tags
365FarmNet GmbH / CLAAS CropView	Berlin/Germany	Farm Management Software	Precisionfarming, Aerialphotography
AEGRO	Rio Grande do Sul/Brasil	Farm Management Software	Precision Agriculture, Big Data, Machinery Management
Aggrigator	California/USA	Marketplace	Marketplace, Local Produce, Love Of Local
AGRALOGICS	California/USA	Precision Agriculture and Predictive Data Analytics	Geospatial, Artificial Intelligence, Information Technology
AGRIVI d.o.o.	London/UK	Farm Management Software	Precision Agriculture, Agtech, Farm Management
Agrologies	Attaki/Greece	Smart Irrigation	Precision Agriculture, Agritech, Water First, Foodinnovation
AGROMENTUM LTD / Fieldin	HaZafon, Israel	Precision Agriculture and Predictive Data Analytics	Agriculture, AgTech, Information Technology
Agrostar	Maharashtra/India	Precision Agriculture and Predictive Data Analytics	Precision Agriculture, Pest Treatment
Agworld Inc.	California/USA	Precision Agriculture and Predictive Data Analytics	Precision Agriculture, Sentineldata, Earth Observation
AWHERE INC / Maps4ER	Denver/USA	Farm Management Software	Farm Management, Weather Forecasting
Benson HILL Biosystems Inc.	Missouri/USA	Plant Data/Analysis	Precision Agriculture, Biotechnology, Machine Learning, Cloud Computing, CRISPR
CIBO Technologies Inc.	Massachusetts/USA	Precision Agriculture and Predictive Data Analytics	AgTech, Big Data, Simulation, Artificial Intelligence
CONNECTERRA B.V. / IDA	Amsterdam/Netherlands	Animal Data	Dairy, Machine Learning, Artificial Intelligence, Cattle
CROPMETRICS TM / Cropmetrics	Nebraska/USA	Farm Management Software	Farm Management, Yield Mapping
DATAVÄXT AB /Cropsat	Hyringa/Sweden	Precision Agriculture and Predictive Data Analytics	Agtech, Sentinel
EOMAP GMBH & CO. KG	Seefeld/Germany	Precision Agriculture and Predictive Data Analytics	Geospatial, Mapping Services
EXA COMPUTING GMBH / Exatrek	Hamm/Germany	Farm Management Software	Fleet management, Agricultural machinery
Farmbot Australia Pty Limited	Victoria/Australia	Smart Irrigation	Precision Agriculture, Water Management
FARMDOK GmbH /Farmdok	Wieselburg/Austria	Farm Management Software	Farm Management
FARREE GmbH / Farmee	Stuttgart/Germany	Precision Agriculture and Predictive Data Analytics	Vertical Farming
FarmFacts GmbH a BayWa Company / NextFarming	Pfarrkirchen/Germany	Farm Management Software	Precisionagronomy, Agtech
FRONTIER AGRICULTURE LTD / SOYL	Newbury/UK	Robotics and Drones	Farm Management, Yield Mapping, UAV Technology
GAMAYA SA / Soyfit, Canefit	Morges/Switzerland	Robotics and Drones	Artificial Intelligence, UAV Technology, Gespatial Data, Drones
GLOBAL SURFACE INTELLIGENCE LTD / CropNow	Glasgow/Ireland	Precision Agriculture and Predictive Data Analytics	GSI Carbon, datarefinery
GreenSense GmbH / GreenSense, EO4Water	Vienna/Austria	Precision Agriculture and Predictive Data Analytics	Geospatial Data
HUMMINGBIRD TECHNOLOGIES LTD / Hummingbird	London/UK	Precision Agriculture and Predictive Data Analytics	Analytics, Artificial Intelligence, Machine Learning
IBF Servizi S.p.a.	Jolanda di Savoia/Italy	Robotics and Drones	Precision Agriculture, UAV, Aerial Photography, Satellite Data
MyEasyFarm / Myeasyfarm	Bezannes/France	Precision Agriculture and Predictive Data Analytics	Precisionag, Agriculture, Precisionagriculture
ONESOIL / Onesoil	Minsk/Belarus	Precision Agriculture and Predictive Data Analytics	Artificial Intelligence, Gespatial Data
ORBITAL INSIGHT INC / OI GO	Mountain View/USA	Precision Agriculture and Predictive Data Analytics	AI, Agtech, Surveillance
PEAT GmbH/ Plantix	Berlin/Germany	Plant Data/Analysis	Plantdoctor, Plantdiagnostics
PICTERRA / Picterra Precision Agriculture	Chavannes/Switzerland	Robotics and Drones	Computer Vision, Artificial Intelligence, Drones, Machine Learning
PIXD SA	Lausanne/Switzerland	Robotics and Drones	Photogrammetry, LIDAR, Computer Vision, Geospatial, Image Recognition, Robotics
PROSPERA TECHNOLOGY LTD / Prospera	Tel Aviv/Israel	Farm Management Software	Farm Management, computervision, Gespatial Data, AI
RESONON / Spectronon	Bozeman/USA	Precision Agriculture and Predictive Data Analytics	Hyperspectral, Remotesensing
REZATEC LTD / Rezatec agriculture	Harwell/UK	Farm Management Software	Farm Management, Yield Mapping, Machine learning
SAMSYS / Samsys	Lille/France	Precision Agriculture and Predictive Data Analytics	AgTech, IoT,Euratechnologie,
SMART CLOUD FARMING GmbH / SoilEye	Berlin/Germany	Precision Agriculture and Predictive Data Analytics	Artificial Intelligence, Insitu, Geospatial Data, Machine Learning
Strider LLC	Minas Gerais/Brazil	Plant Data/Analysis	Precision Agriculture, Pest Control , Machine Application
TARANARIS VISUAL LTD / Taranis	Tel Aviv/Israel	Robotics and Drones	Farm Management, light aircraft, Gespatial Data
TerrAvion Inc.	California/USA	Robotics and Drones	Precision Agriculture, Developer Tools, Robotics

Project/Company	SMART CLOUD FARMING GmbH
URL	https://www.smartcloudfarming.com
Contact	Michele Bandecchi – Founder
E-Mail	bandecchi@smartcloudfarming.com
State	Germany/Berlin
Pitch	To leverage technology, to improve soil restoration, unlock crop potential and deliver high quality and sustainable agriculture.
Product/Service	SoilEye
General Information	<p>Smart Cloud Farming uses satellite images to characterize the soil, and generate practical, data-driven recommendations towards customized farming practices to maximize crop yield. The company claims to have developed the first artificial intelligence, using cloud-based algorithms to simulate crop yield based on high resolution soil maps and local climate conditions.</p> <p>SoilEye recommendations are based on high resolution satellite and/or drone images, instead of pre-existing soil-property maps. Those high-resolution satellite images are then translated to soil electrical conductivity maps and soil organic moisture maps. Resulting from those maps the farmer is given decision support towards crop management decisions. SoilEye claims to be able to raise crop yield by 20%.²</p> <p>The 3-dimensional soil-property maps reach a 2-dimensional resolution of < 1 hectare and depths of up to 90 cm with a precision of > 95 %.³</p> <div data-bbox="414 1052 1388 1859" data-label="Diagram"> <p>THE SOILEYE APPROACH - VISUAL</p> <p>The diagram illustrates the Soileye process flow:</p> <ul style="list-style-type: none"> Satellite images: Provide data on soil reflectance, NDVI, and Moisture Index. Sensor data: Includes soil humidity, precipitation level, soil temperature, solar radiation, and soil salinity (N and P levels). SoilEye algorithm: Generates 3D digital soil maps using AI. Automation of agro-systems and tractors: Utilizes the generated maps for field operations. Prediction of crop and soil health: Provides insights and recommendations based on the data. <p>©2019 SMART CLOUD FARMING</p> </div>
Partner	Fraunhofer Institute, Copernicus Accelerator

² See <https://www.smartcloudfarming.com/benefits> (retrieved 1.9.2019)

³ See <https://www.seedhouse.de/ueber-uns/die-startups/smart-cloud-farming.html> (retrieved 1.9.2019)

Stage	Seed
Target Group/Sector	Farmer, Paying Agencies, Agro Industry
Funding⁴	Seed Finance planned 2019
Awards	Deep Tech Star 2019 (Berlin), BPW (Berlin), Fraunhofer Venture
Further Information	https://www.youtube.com/watch?time_continue=1&v=Pdbslynvy6c
Tags	Artificial Intelligence, Insitu, Geospatial Data, Machine Learning

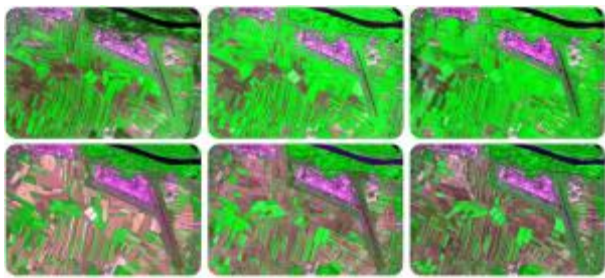
⁴ If funding sum is given: <https://www.crunchbase.com> (1.-4.9.2019)

Project/Company	HUMMINGBIRD TECHNOLOGIES LTD
URL	https://hummingbirdtech.com/
Contact	Will Wells – Founder
E-Mail	will@hummingbirdtech.com
State	London/UK
Pitch	“Hummingbird is a remote sensing and artificial intelligence business. We gather imagery of arable fields from satellites, planes and UAVs and then analyse it using sophisticated machine learning techniques. From this, we create detailed insights that are crop specific, and application maps that provide actionable information to farmers and agronomists.” ⁵
Product/ Service	Hummingbird
General Information	<p>Hummingbird offers a crop analytics and field insights platform using remote sensing, based on algorithms, computer vision and machine learning combined. Hummingbird is a remote sensing and artificial intelligence business. They gather imagery of arable fields from satellites, planes and UAVs and then analyse it using machine learning techniques. From this, they create detailed insights that are crop specific, and application maps that provide actionable information to farmers and agronomists – they promise targeted applications within 24 hours.</p> <p>The algorithms of Hummingbird provide data about:</p> <ul style="list-style-type: none"> • the accurate count of the number of plants in a field for specific crops, such as potato, corn, cotton and sugar cane • a prediction of where grassweed is most probable to sprout in high density, allowing to optimize herbicide-applications • canopy coverage in potato-farming, for an estimation of irrigation needs • crop biomass in wheat-farming and barley-farming, for estimation of irrigation needs ⁶
Partner	SALIC, GOOGLE, ESA, BASF, UK Space Agency
Stage	Series B
Target Group/Sector	Farmer, Agro Industry, Insurance
Funding	15 Mio/Founded in 2015 (\$)

⁵ <https://hummingbirdtech.com/the-process/> (retrieved 2.9.2019)

⁶ See <https://hummingbirdtech.com/crops-and-products/brazil/> (retrieved 2.9.2019)

Awards	UK Business Angels Association, CogX Innovation Award, KPMG Best British Tech Startup
Further Information	https://www.arabianbusiness.com/technology/420749-saudis-salic-invests-in-uk-agricultural-tech-firm
Tags	<u>Analytics</u> , <u>Artificial Intelligence</u> , <u>Machine Learning</u>

Project/Company	GREENSENSE GMBH
URL	http://www.greensense.at/
Contact	Francesco Vuolo – Founder
E-Mail	francesco.vuolo@boku.ac.at
State	Vienna/Austria
Pitch	<p>“What do we do? We transform complex data into information so that you get always the most recent information for your fields.</p> <p>Why do we do it? Because we like technologies and believe that they can help to achieve a more productive and sustainable agricultural production.</p> <p>How do we do it? We use high spatial resolution satellite images from Sentinel-2, agrometeorological data and a suite of models that consider soil, plants and your crop management.”⁷</p>
Product/Service	GreenSense, EO4Water
General Information	<p>GreenSense and EO4Water make use of Copernicus Sentinel-2 satellite data. First a desired area is chosen by the customer via shapefile. Then the satellite data on various spectrums (infrared, near infrared, visible light,...) is combined with data on the prevalent soil properties and individual customer information regarding crop type, artificial fertilization/irrigation and so on. This procedure results in a map with individual information on every square metre of the area. According to the customers preferences the area is divided up into management zones of the requested size. For each individual management zone, the calculations of the programs result in an optimized fertilization (greensense) or respectively irrigation (EO4Water) management plan. Multiple Copernicus datapoints across time are taken into consideration for the calculations. The management plan can be exported as csv, txt or even directly be used by software-solutions of agricultural machinery companies like John Deere.</p> 
Partner	Universität für Bodenkultur, Agrar Commander, Raiffeisen Ware Austria
Stage	Seed
Target Group/Sector	Precision Farming
Funding	Spin Off Boku
Awards	
Further Information	Free testing (Sept. 2019) user: demo ; pw: demo
Tags	Geospatial Data

⁷ <http://www.greensense.at/mission/> (retrieved 1.9.2019)

⁸ See <http://www.greensense.at/api-reference/> (retrieved 1.9.2019)

Project/Company	FARMEE GMBH
URL	https://www.farmee.io/
Contact	Steffen Abel - Founder
E-Mail	hello@farmee.io
State	Stuttgart/Germany
Pitch	There is a new generation of farmers. And you can be one of them. Let's put this straight: anybody can be a farmer today. You might be living in the city and you probably did not grow up on a farm. But you want to have a closer connection to your food. That means transparency about where your food comes from, how long it has travelled and what's in it. You can't get closer than growing yourself! ⁹
Product/Service	Software for process optimization in small scale urban farming Currently (September 2019) no product available, test run carried through in early 2018 ¹⁰
General Information	Digital services for new farmers: producing fresh food in urban environments. The goal is developing digital products and services that enable customers to become a successful producer of fresh and healthy vegetables. Farmee aims at being a digital companion, guiding the customer along the way to a rich harvest. ¹¹
Partner	University of Hohenheim, German startups association, foodstars
Stage	
Target Group/Sector	(Urban)Farmers
Funding	
Awards	Green innovation and investment forum 2018 - finalist
Further Information	
Tags	Vertical Farming

⁹ See <https://www.farmee.io/> (retrieved 1.9.2019)

¹⁰ See <https://www.stuttgarter-nachrichten.de/inhalt.start-up-aus-stuttgart-urban-farming-neue-software-laesst-salat-spriessen.dacb8f19-c1f1-4896-8b56-614eaa23fad4.html> (retrieved 1.9.2019)

¹¹ See <https://www.farmee.io/> (retrieved 1.9.2019)

Project/Company	FARMDOK GmbH
URL	https://www.farmdok.com/
Contact	Andreas Prankl
E-Mail	Andreas.prankl@farmdok.com
State	Wieselburg/Austria
Pitch	“FARMDOK is the digital tool for planning and documentation in agriculture” ¹²
Product/Service	FARMDOK
General Information	<p>FARMDOK AgTech-Startup from Wieselburg (Lower Austria), is developing smart farming solutions as a tool for improving planning and documenting procedures in agriculture. FARMDOK offers a mobile app for data input and a web app for analysis of data. a wide range of services is provided by FARMDOK. Those services include accounting and management tools, a tool for wage prediction in case of contract work, farming-action planning and documenting, which supports the customer in abiding the law when it comes to the use of pesticides and fertilizer.</p> <p>There are seldomly office employees in agricultural enterprises, so FARMDOK tries to relieve their customers of burden connected to bureaucracy, thereby enabling them to focus on their key competences. ¹³</p>
Partner	ACCENT Gründerservice
Stage	Series A
Target Group/Sector	Farmers
Funding	700 000€
Awards	Agritechnica Innovation Award 2017 – silver medal
Further Information	<p>https://www.youtube.com/watch?time_continue=3&v=bv1nP8PogBw free trial for documentation-tool (9.2019)</p> <p>Mobile-app as well as web-app</p> <p>Subscription model: annually 1,24€ per hectare for the full service¹⁴</p>
Tags	Farm Management

¹² <https://www.farmdok.com/> (retrieved and translated 2.9.2019)

¹³ See <https://www.farmdok.com/> (retrieved 2.9.2019)

¹⁴ See <https://www.farmdok.com/preise/> (retrieved 2.9.2019)

Project/Company	FRONTIER AGRICULTURE LTD
URL	https://www.soyl.com
Contact	
E-Mail	info@soyl.co.uk
State	Newbury, UK
Pitch	<p>“SOYL is the leading precision crop production service provider in the UK. SOYL produces and interprets variable rate maps covering over 1 million hectares of land and its software technology is in use in over 15 countries worldwide. Innovative technology, robust data, expert advice and technical support are used to improve growers’ economic, agronomic and environmental performance.</p> <p>As pioneers in UK precision farming since 1993 we know the difference between sustainable improvements to crop production and the latest trends. Our early commitment to the principle of applying inputs at the right rate and in the right place led the way for 20 years of scientific innovation. Today, SOYL still leads the way and our commercial services are backed by the UK’s largest precision farming specific research and development programme.”¹⁵</p>
Product/Service	SOYL, iSOYL, iSOYLscout
General Information	<p>SOYL services</p> <p>SOYLSense for nitrogen mapping</p> <p>During the growing season remote sensing technology (satellite images) is used to gain around 14 datapoints over time, describing the crop canopy and its change over time. The area can then be managed using variable rate applications of nitrogen, based on this data. Nitrogen has a larger effect on crop yields than other nutrients, therefore it is separately dealt with. SOYL predicts a monetary advantage of 27 pounds per hectare over uniform nitrogen application</p> <p>Nutrient mapping:</p> <p>A SOYL trained sampler samples the soil using GPS. SOYL uses strategic sampling (based on a soil electric conductivity map) and take a minimum of one sample per hectare. These soil samples analysed for the elements: phosphorus, potassium, magnesium and pH. Based on the results SOYL creates maps for each field showing nutrient variation across the field. – This map can be used to optimize the use of fertilizer, by reducing the fertilizer expenditure and improving yield, wherever one of the sampled elements is the limiting factor for plant growth. SOYL also provides services that aim at optimizing seed rates and cultivations depth.¹⁶</p> <p>iSOYL:</p> <p>“App which allows you to manage your precision crop production tasks direct from the tractor cab via your iPad. Variable rate application files created in MySOYL are seamlessly transferred to iSOYL ready to be used in the field. The large, clear touch-screen makes it easy to view and manage your files. After application, data can be sent back directly to your crop management system, eliminating the need for written notes.”¹⁷</p> <p>iSOYLscout:</p> <p>“iSOYLscout is a field scouting app for iPhones and iPads which enables growers, or anyone else helping to manage the business, to log features and problems on the land while they are actually in the field. The app makes the recording, monitoring and review of in-field problems and variations much easier for farmers.”¹⁸</p>
Partner	Frontier Agriculture, Wells Agriculture
Stage	Scale Up, Part of Frontier Agriculture Group
Target Group/Sector	Farmers

¹⁵ <https://www.soyl.com/about/about-2> (retrieved 2.9.2019)

¹⁶ See <https://www.soyl.com/services> (retrieved 2.9.2019)

¹⁷ <https://www.soyl.com/services/soyl-apps/isoyl> (retrieved 2.9.2019)

¹⁸ <https://www.soyl.com/services/soyl-apps/isoyl-scout> (retrieved 2.9.2019)

Funding	
Awards	
Further Information	Various preprogramed calculators for nutrient loss due to straw removal, and other soil health parameters ¹⁹
Tags	Farm Management, Yield Mapping, UAV Technology

¹⁹ See <https://www.soyl.com/contact/calculators> (retrieved 2.9.2019)

Project/Company	AWHERE INC
URL	https://www.awhere.com
Contact	John Corbett (Founder)
E-Mail	https://www.awhere.com/contact-us/
State	Denver/USA
Pitch	„aWhere is an information technology company that provides real-time, contiguous weather data to de-risk agriculture. As a Benefit Corporation, we are focused on empowering farmers and actors along the entire agriculture value chain make better decisions to adapt to weather variability due to climate change. “ ²⁰
Product/Service	In-time weather data, weather insights/Maps4ER
General Information	<p>High quality in-time weather data provided by data from a dense network of weather stations combined with the advantages of satellite image data. There is a range of values collected.</p> <ul style="list-style-type: none"> • basic data like precipitation, temperature, wind speed, ... • advanced data like growing degree days, potential evapotranspiration, ... • advanced indices like precipitation over potential evapotranspiration <p>With weather insights and Maps4ER Awhere aims at delivering economic resilience to farmers around the world, by providing them with weather insights. A variety of crop models fuelled with in time weather data provide actionable solutions for farmers. It does so by predicting pests and diseases, analysing the suitability of crops for a region, providing an irrigation management plan and introducing the implications of climate change to agricultural management. ²¹</p>
Partner	Frontier Agriculture
Stage	Series B, founded 2007
Target Group/Sector	Farmers
Funding	Approx 20 Mio (\$)
Awards	
Further Information	30 days free trial (9.2019)
Tags	Farm Management, Yield Mapping, UAV Technology

²⁰ <https://www.awhere.com/> (retrieved 2.9.2019)

²¹ See <https://www.awhere.com/in-time-weather-data/> (retrieved 2.9.2019)

Project/Company	CROPMETRICS
URL	https://cropmetrics.com/
Contact	Nick Emanuel (founder)
E-Mail	info@cropmetrics.com
State	Nebraska/USA
Pitch	“CropMetrics was founded by growers, for growers, helping them “irrigate with confidence” since 2009. We develop and supply the full precision irrigation solution for a grower / trusted adviser, optimizing profits while increasing water, nutrient and energy use efficiency.” ²²
Product/Service	CropMetrics
General Information	Irrigation optimization by combining soil sensors providing data on parameters like root growth and soil moisture content with CropMetrics virtual predictor technology. The virtual predictor technology takes into account the data of the soil sensors, various growth models for different crops and state of the art weather data. It predicts a schedule of irrigation events, drastically reducing the amount of water needed for the crop compared to enterprises with traditional irrigation planning. ²³
Partner	
Stage	Series a, founded 2009
Target Group/Sector	Farmers
Funding	Approx 1,5 Mio (\$)
Awards	
Further Information	https://www.youtube.com/watch?v=a4qfheuJ2Rc
Tags	Farm Management, Yield Mapping, UAV Technology

²² <https://cropmetrics.com/> (retrieved 2.9.2019)

²³ See <https://cropmetrics.com/#www> (retrieved 2.9.2019)

Project/Company	REZATEC
URL	www.rezatec.com
Contact	Mark Maslin (Founder)
E-Mail	info@rezatec.com
State	Harwell/UK
Pitch	„Rezatec provides Big Data geoanalytics. We use our proprietary algorithms and advanced machine learning techniques to deliver strategic, commercial insight for our customers. We deliver actionable insights as Data-as-a-Service landscape intelligence via our online decision support portal.” ²⁴
Product/Service	Rezatec agriculture
General Information	<p>“Using the most appropriate Earth Observation techniques from a multitude of data sources including satellite optical and RADAR data, aerial and unmanned aerial vehicle (UAV) imagery and ground-based observations, we provide decision support tools to help agribusinesses:</p> <ul style="list-style-type: none"> • Improve crop yield and reduce production costs • Measure and monitor crops for evidence of yield improvement and cost reduction • Plan crops for better use of resources on a season by season basis • Forecast yield for optimizing logistics and storage for food processors • Assure responsible sourcing approach, e.g. zero deforestation • Improve supply chain resilience • Meet regulatory compliance • Disseminate information amongst stakeholders • Analyze historic land use • Assess environmental and carbon impact <p>Decision-support tools include:</p> <ul style="list-style-type: none"> • Crop identification and field mapping • Crop health and early stress detection • Pasture management • Supply chain optimisation • Productivity and profitability • Sustainability assessment ”²⁵
Partner	European associations of remote sensing companies
Stage	Series A, founded 2012
Target Group/Sector	Farmers
Funding	Approx 4,2 Mio (\$)
Awards	
Further Information	Products for forestry, infrastructure and financial services; special tool for grass management https://www.youtube.com/channel/UCeMu8m5qZkKS_tjM-xhy2MQ?sub_confirmation=1
Tags	Farm Management, Yield Mapping, UAV Technology, Machine Learning

²⁴ <https://www.rezatec.com/> (retrieved 3.9.2019)

²⁵ <https://www.rezatec.com/services/food-agriculture/> (retrieved 3.9.2019)

Project/Company	TARANARIS VISUAL LTD
URL	http://www.taranis.ag/
Contact	Ofir Schlam (founder)
E-Mail	info@taranis.at
State	Tel Aviv/Israel
Pitch	<p>“Taranis is led by a vision to bring precision and control to the agriculture industry across the world, helping growers to maximize and stabilize yield from their crops.</p> <p>We create full visibility throughout the field at leaf-level precision, through high-resolution aerial surveillance imagery. Our leading precision agriculture intelligence platform uses sophisticated computer vision, data science and deep learning algorithms to generate granular insights for the prevention of crop yield loss from diseases, insects, weeds, and nutrient deficiencies.”²⁶</p>
Product/Service	Taranis
General Information	<p>Taranis offers decision support tools based on aerial imagery. The data is a product of a multi stage scouting approach. The first step is to prioritize areas. This is achieved by analysis of satellite images. In the second step high precision image resolution at 0.3-0.5mm per pixel is retrieved by one of 60 Taranis light aircrafts.</p> <p>In addition, Taranis is running a field level local weather forecast with a high granularity (very small spatial calculation units).</p> <p>Yield maps of various crops are taken into consideration, to provide services like disease prediction models or precision applications for management software solutions in agricultural machinery.</p> <p>Also part of their service portfolio:</p> <ul style="list-style-type: none"> • The detection of emerging weed • Plant population count • Crop specific management plans • Mobile App for field scouting and threat management • Field health estimations, on grounds of nutrient calculations and plat temperature measurements²⁷
Partner	
Stage	Series B, founded 2014
Target Group/Sector	Farmers
Funding	Approx. 30 Mio Funding
Awards	
Further Information	
Tags	Farm Management, UAV Technology, Gespatial Data

²⁶ <http://www.taranis.ag/english/about-us/> (retrieved 3.9.2019)

²⁷ See <http://www.taranis.ag/english/features/> (retrieved 3.9.2019)

Project/Company	PROSPERA TECHNOLOGY LTD
URL	http://prospera.ag/
Contact	Daniel Koppel (founder)
E-Mail	info_hq@prospera.ag
State	Tel Aviv/Israel
Pitch	„Our quest started with a puzzle. How is it that neighboring fields, with identical climates, cultivated by the same farmer, with the same seeds, fertilizers and irrigation, produce widely varied yields, sometimes tens of percentage apart?“ ²⁸
Product/Service	Prospera
General Information	Prospera develops sensors, combining advanced computer vision, a micro weather station and soil probes. A scouting app digitalizes agronomical information and a hub integrates data from other sensors & sources. Prospera claims that this integrated data can provide optimized yield predictions with an accuracy of 95%. By the use of seeding and harvesting planning and other actionable management support, Prospera provides the services of its price-winning artificial intelligence to enable a maximum output in agricultural enterprises. ²⁹ Special tool for irrigation optimization as a product of a strategic partnership with valley irrigation. Data acquisition is provided by satellite imagery, drone imagery and soil probes. ³⁰
Partner	Cisco, Qualcomm Ventures, Valley Irrigation
Stage	Series B, founded 2014
Target Group/Sector	Farmers
Funding	Approx. 22 Mio (\$)
Awards	CB Insights 2017 world top 100 AI companies, Disrupt 100 2017 best AI product in agriculture
Further Information	https://www.businessinsider.com/prospera-robot-can-see-dying-plants-before-farmers-2016-7?IR=T https://www.valley-prospera.com/
Tags	Farm Management, UAV Technology, Gespatial Data, AI

²⁸ <https://home.prospera.ag/about> (retrieved 3.9.2019)

²⁹ See <https://home.prospera.ag/> (retrieved 3.9.2019)

³⁰ See <https://www.valley-prospera.com/> (retrieved 3.9.2019)

Project/Company	GAMAYA SA
URL	https://gamaya.com/
Contact	Yosef Akhtman (founder)
E-Mail	info@gamaya.com
State	Switzerland
Pitch	<p>“Know your land Gamaya improves efficiency and sustainability of farming businesses by offering compelling agronomy solutions, enabled by hyperspectral imaging and artificial intelligence”³¹</p>
Product/Service	Gamaya, Soyfit, Canefit
General Information	<p>Specialized on soy bean and sugar cane farming, Gamaya provides agronomy solutions for optimal yields. The process starts with the systematic collection of multispectral satellite and drone imagery about the desired areas. The focus lies on various wavelengths of visible and infrared light, because Gamaya connects specific spectrums of wavelengths to specific diseases and other plant conditions.</p> <p>Along with historic climate data and present time weather data, as well as crop specific growth models, the AI equipped software uses the multispectral imagery to predict the yields of different crops and different management approaches and intensities. These predictions result in different maps you can administer in a mobile app as well as in a web app. The maps can then be translated into specific targeted management plans for seeding, use of fertilizer, use of pesticides, irrigation and harvest.³²</p>
Partner	
Stage	Series B, founded 2015
Target Group/Sector	Farmers
Funding	Approx. 15,5 Mio (CHF)
Awards	
Further Information	https://www.businessinsider.de/gamaya-raises-32-million-to-use-drones-and-ai-for-agriculture-2016-5?r=UK
Tags	Artificial Intelligence, UAV Technology, Gespatial Data, Drones

³¹ <https://gamaya.com/> (retrieved 3.9.2019)

³² See <https://gamaya.com/our-technology/> (retrieved 3.9.2019)

Project/Company	ONESOIL
URL	https://onesoil.ai/en/
Contact	Slava Mazai
E-Mail	slava@onesoil.ai
State	Minsk/Belarus
Pitch	<p>“Make reliable agricultural decisions with AI Get to know the field in seconds and take informed actions with the OneSoil platform. To make farming simple, we analyze satellite images with machine learning technologies.”³³</p>
Product/Service	<p>Onesoil Hardware: modem, weather sensor; Onesoil Software: crop detection, field recognition, mobile app</p>
General Information	<p>The Onesoil hardware (modem) is on the one hand designed to give farmers access to data (sentinel 1) they would normally struggle to get in a useable form, on the other (weather sensor) it enables farmers to allow for a more individual dataset.</p> <p>The weather station features:</p> <ul style="list-style-type: none"> • Soil moisture and temperature measurement • Air humidity and temperature measurement • Cloudy and sunny days detection • Dew point calculation • Growing degree-day calculation • Precipitation rate measurement • Plant disease prediction (planned) • Pest emergence prediction (planned) <p>On the software side Onesoil provides solutions for</p> <ul style="list-style-type: none"> • Detecting clouds, shadows and snow with an accuracy of 0,9 • Allocating field boundaries • Determining the sowing date and plant phenophase • Detecting more than 20 crops in the middle of season <p>The mobile application aims at the automation of agriculture in its entirety. Various data sources like on sight sensors and satellite imagery are combined to provide planned functions like:</p> <ul style="list-style-type: none"> • Prediction of yield • Planning and monitoring of field work • Recommendations to the farmer at all stages of work • Predict plant diseases and the emergence of pests ³⁴
Partner	
Stage	Series A, founded 2017
Target Group/Sector	Farmers
Funding	Approx. 0,5 Mio (\$)
Awards	
Further Information	<p>https://aws.amazon.com/de/blogs/startups/insights-farming-onesoil/ https://map.onesoil.ai/2018/at/vienna#12.85/48.16448/16.26418 https://play.google.com/store/apps/details?id=io.onesoil.scouting&referrer=utm_source=website&utm_medium=main_page&anid=admob</p>

³³ <https://onesoil.ai/en/> (retrieved 3.9.2019)

³⁴ See <https://onesoil.ai/en/technologies> (retrieved 3.9.2019)

	roll out: 2018: services in USA and EU, 2019: planned services in Canada, Mexico, Russia, India,... 2020 rest of the world
Tags	Artificial Intelligence, UAV Technology, Gespatial Data

Project/Company	PEAT GMBH
URL	https://peat.technology
Contact	Simone Strey (founder)
E-Mail	contact@peat.ai
State	Berlin/Germany
Pitch	“Improve your profitability with the latest technologies and globally pooled farming know-how. If you are a farmer, agricultural worker or consultant, Plantix is your reliable partner for best practices in agriculture, disease control, and yielding better crops” ³⁵
Product/Service	Plantix, Plant disease library
General Information	<p>Plantix can be described as a mobile plant doctor. The procedure works by taking a picture of the crop, then the mobile, AI integrated Plantix app will analyse the picture and provides you with information about the possible diseases, their cure and customized prophylaxis suggestions. The disease recognition process works with the help of a machine learning innovations, trained with the image data of patterns connected to a number of plant diseases. PEAT claims, that Plantix processes 14 000 pictures per day.</p> <p>Plantix also includes access to an active community, thereby they provide the customers with a possibility to help each other.³⁶</p>
Partner	Landwirtschaftskammer Niedersachsen, Leibniz Universität Hannover
Stage	Seed
Target Group/Sector	Farmers
Funding	Approx. 5,6 Mio (€)
Awards	
Further Information	<p>https://www.youtube.com/watch?v=0tQ_k3G17g</p> <p>https://plantix.net/plant-disease/en</p>
Tags	Plantdoctor, Plantdiagnostics

³⁵ <https://plantix.net/en/> (retrieved 3.9.2019)

³⁶ See <https://plantix.net/en/> (retrieved 3.9.2019)

Project/Company	CONNECTERRA B.V.
URL	https://www.connecterra.io/
Contact	Saad Ansari (founder)
E-Mail	info@connecterra.io
State	Amsterdam/Netherlands
Pitch	“IDA for Enterprises is a cloud-based solution that integrates real-time sensor data, integrates farm management data and also understands the farmers daily routine. Based on proprietary data and algorithms, IDA for Enterprises enables predictive insights on animal welfare, traceability and sustainability targets.” ³⁷
Product/Service	IDA, related hardware
General Information	<p>CONNECTERRA is a provider of hardware to dairy farmers. There are sensors, that are mounted on cownecks, they can then differentiate between 7 distinct behaviours. The information of these sensors is collected in a so-called base station, which can also be connected to field access points if large areas need to be covered. The base station is also provided by CONNECTERRA.</p> <p>With the primary data collected by the IDA sensors, information from state-of-the-art farm management systems and third-party data sources, IDA acts as an artificial intelligence-based decision support application. It predicts calving dates, calculates amount and cost of feeding stuff, and measures complex parameters like animal welfare and overall farm performance. It also claims to be better than humans in recognising diseases in animals (1-2 days before an average farmer would grow aware of the condition).³⁸</p>
Partner	
Stage	Series A, founded 2014
Target Group/Sector	Saad Ansari
Funding	Approx. 9,5 Mio (\$)
Awards	
Further Information	<p>https://www.youtube.com/watch?v=h8DM3Wq3a18 cost/month and cow: 4€ for the full service + 65€ startup fee per cow (3.9.2019)</p>
Tags	Dairy, Machine Learning, Artificial Intelligence

³⁷ <https://ida.io/ida-for-enterprises/> (retrieved 3.9.2019)

³⁸ See <https://ida.io/ida-for-farmers/> (retrieved 3.9.2019)

Project/Company	EXA COMPUTING GMBH
URL	https://www.exatrek.de/
Contact	Dietrich Kortenbruck (CEO)
E-Mail	https://www.exatrek.de
State	Hamm/Germany
Pitch	“The Exatrek app provides you with simple fleet management. Exatrek connects all agricultural machinery on one platform. You always know where the machinery is located and have access to real time performance data. All relevant pieces of information are being documented for you. Automatically.” ³⁹
Product/Service	Exatrek, related hardware
General Information	EXA COMPUTING GMBH provides sensors for tractors as well as other agricultural machinery. These sensors enable the Exatrek app to collect data about productive time, performance data, location and others, and provide it to the customer. The app is mainly aimed at customers, managing large fleets of agricultural machinery, to optimize their fleet management. They claim to achieve fuel savings of 10%. ⁴⁰
Partner	
Stage	Seed, founded 2018
Target Group/Sector	Farmer
Funding	
Awards	
Further Information	Full access all Exatrek functions for 69,90€ monthly (3.9.2019)
Tags	Fleet management, Agricultural Machinery

³⁹ <https://www.exatrek.de/index.html> (retrieved and translated 3.9.2019)

⁴⁰ See <https://www.exatrek.de/index.html> (retrieved 3.9.2019)

Project/Company	AGROMENTUM LTD
URL	https://www.fieldin.com/
Contact	Boaz Bachar (founder)
E-Mail	jobs@fieldintech.com
State	HaZafon, Israel
Pitch	<p>“The Control Center for Specialty Crops Harvest smarter with Fieldin Optimize harvesting, spraying and other cultural practices with our Smart Farming Platform, and receive actionable data from harvesters, sprayers, shakers and more...”⁴¹</p>
Product/Service	Fieldin, related hardware
General Information	<p>Fieldin is designed for specialty crop growers. They provide smart spraying and smart harvesting practices. Data from smart sensors, provided by Fieldin and satellite imagery is collected, analysed by the Fieldin platform, which finally translates the collected data into decision support for customers.</p> <p>There is also a scouting app, identifying pest types and stages, maps with pest hotspots to provide help for placing traps. On top it includes a convenient way of documenting the process. Planning tools like spray schedulers, spray quality report, equipment tracking, efficiency reports are further additions to the Fieldin product portfolio.⁴²</p>
Partner	
Stage	Series A, founded 2013
Target Group/Sector	Farmer
Funding	Approx. 6 Mio (\$)
Awards	
Further Information	<p>https://www.youtube.com/watch?v=XXzo0yxwZFk https://www.fieldin.com/fieldin-featured-on-modern-acre-podcast/</p>
Tags	Agriculture, AgTech, Information Technology

⁴¹ <https://www.fieldin.com/> (retrieved 4.9.2019)

⁴² See <https://www.fieldin.com/spraying/> (retrieved 4.9.2019)

Project/Company	MY EASY FARM
URL	https://www.myeasyfarm.com
Contact	Jean-Baptiste Thierart (founder and CEO)
E-Mail	https://www.myeasyfarm.com/contact
State	Bezannes/France
Pitch	<p>“MyEasyFarm accompanies the farmer every day, to make good decisions and be more efficient to maximize competitiveness and profitability, while preserving the environment.</p> <p>Plan your routes and culture interventions at the right time with the right dose. Better use of your materials, prepare the work from your desktop, assign tasks to your team, follow in real time the progress, analyse the results!”⁴³</p>
Product/Service	MyEasyFarm
General Information	The MyEasyFarm app gives the customer tools for managing plots describing their fields, fleet management, cost planning, automated documentation, material management and a possibility to display all data connected to your individual field. The key functions of MyEasyFarm are real time monitoring of staff and agricultural machinery, in-time weather information and decision support for crop management, based on data from maps (soil analysis, plant density cards, limitation of inputs, outputs). ⁴⁴
Partner	Precifield, DKE Data, Agricultural Industry Electronics Foundation
Stage	Seed/Early Stage
Target Group/Sector	Farmer
Funding	
Awards	
Further Information	https://www.myeasyfarm.com/demo-en-ligne - free daily 60-minute webinars to get to know the product
Tags	Precision Farming

⁴³ <https://www.myeasyfarm.com/> (retrieved 4.9.2019)

⁴⁴ See <https://www.myeasyfarm.com/fonctions> (retrieved 4.9.2019)

Project/Company	ORBITAL INSIGHT INC
URL	https://orbitalinsight.com/
Contact	James Crawford (founder)
E-Mail	info@orbitalinsight.com
State	Mountain View/USA
Pitch	<p>“Understand what is happening on and to the Earth</p> <p>Using multiple sources of geospatial data and artificial intelligence, we deliver timely, objective and transparent analytics on a global scale. The Orbital Insight GO platform is versatile and designed to answer your specific question about the physical world. What would you like to ask?”⁴⁵</p>
Product/Service	Orbital Insight GO
General Information	Orbital Insight GO translates and analyses large amounts of geospatial data, stemming from satellite imagery, synthetic aperture radar, unmanned aerial vehicles and geolocation signals. Based on this dataset Orbital Insight GO draws conclusions about land use (agricultural relevance) or phenomena like housing growth, foot traffic intensity and others. ⁴⁶
Partner	
Stage	Scale up, founded 2013
Target Group/Sector	Farmer, general population, other businesses
Funding	Approx. 78,7 Mio (\$)
Awards	
Further Information	<p>Other products: OI Consumer (Understand retailer and mall activity at scale across the U.S.) and OI Energy (Monitor global energy supply, demand, assets, and infrastructure.)</p> <p>https://www.youtube.com/watch?v=dMOEUFNhUnk</p>
Tags	AI, AG Tech, Surveillance

⁴⁵ <https://orbitalinsight.com/products/orbital-insight-go/> (retrieved 4.9.2019)

⁴⁶ See <https://orbitalinsight.com/products/orbital-insight-go/> (retrieved 4.9.2019)

Project/Company	GLOBAL SURFACE INTELLIGENCE LTD
URL	https://www.surfaceintelligence.com/
Contact	Matt Tyburski (founder)
E-Mail	Contact form on the website
State	Glasgow/Ireland
Pitch	“Global Surface Intelligence is an Edinburgh-based earth observation and artificial-intelligence-as-a-service provider. We are a uniquely focused data refinery company, with deep roots in environmental sciences, harnessing next generation artificial intelligence to transform satellite optical and radar data, UAV, drone and ground survey data into commercially valuable information, which can be instantly consumed by end users, data brokers, market places, geospatial data publishers and imagery aggregators.” ⁴⁷
Product/Service	CropNow
General Information	<p>CropNow describes itself as a data refinery. Raw data in the form of Radar data, UAV data, drone and ground survey data is inserted and then refined into an actionable database in a five step process:</p> <ol style="list-style-type: none"> 1. DataMart Data Ingestion 2. Geospatial Processing 3. Clean Noise Reduction 4. A.I. and Machine Learning 5. Actionable Database <p>The actionable database can then be used by the Global Surface Intelligence platform to display patterns in maps, or it enables the customer to put the information to your individual use via API integration.</p> <p>Global Surface Intelligence claims to use patented, highly advanced algorithms in their AI and machine learning based technology.⁴⁸</p>
Partner	
Stage	Scale up, founded 2012
Target Group/Sector	Farmer
Funding	Approx. 800 000 (£)
Awards	
Further Information	Other products: ForestNow (forest inventories), LandNow (land classification)
Tags	GSI Carbon, AI, Geospatial Data

⁴⁷ <https://www.surfaceintelligence.com/about> (retrieved 4.9.2019)

⁴⁸ See <https://www.surfaceintelligence.com/technology> (retrieved 4.9.2019)

Project/Company	EARTH OBSERVATION SYSTEM
URL	https://eos.com
Contact	Max Polyakov (president)
E-Mail	info@eos.com
State	California/USA
Pitch	“EOS has created a cloud-based platform and analytics tool from which images and analyses of satellite and other earth observation data are derived in real time for application in business, science, and public policy.” ⁴⁹
Product/Service	EOS Crop Monitoring
General Information	EOS crop monitoring is an advanced digital agro-platform for effective farm management, using real-time insights from satellite data to help customers make reliable decisions and maximize their output. They provide digital field crops zoning and connected to that field state monitoring as well as modelling. Features like crop yield prediction, fertilizer application optimization and real-time field state reports amongst others make up the core of the EOS monitoring and modelling product. In addition to this EOS also provides weather risk management, specifically cold shock and hot shock warnings, as well as climate impact analysis. ⁵⁰
Partner	Airbus, Proagrica, Dronedeploy, SI Imaging Services, Space Will
Stage	Scale up, founded 2012
Target Group/Sector	Farmer
Funding	Approx. 1 Mio (\$)
Awards	
Further Information	Other products for real estate management, news and media, travel tourism and leisure, emergency services, education, training, security, defence and humanitarian operations and health
Tags	Geospatial, RemoteSensing, GIS

⁴⁹ <https://eos.com/> (retrieved 4.9.2019)

⁵⁰ See <https://eos.com/eos-crop-monitoring/> (retrieved 4.9.2019)

Project/Company	SAMSYS
URL	https://samsys.fr/
Contact	contact@samsys.fr
E-Mail	https://samsys.fr/#contact
State	France
Pitch	<p>“SAMSYS The connected Meter for agricultural machinery. Follow interventions, remote maintenance, precise cost estimation and cost reduction”⁵¹</p>
Product/Service	SAMSYS, related hardware
General Information	Samsys provides hardware for tractors and other agricultural machinery. The computers produce data on locations, speed and machine hours. The SAMSYS web application is able to provide customers with locations of machinery and performance data, a way to document activities, aid in maintenance planning of agricultural machinery, exportable graphs about various parameters. ⁵²
Partner	
Stage	Seed
Target Group/Sector	Farmer
Funding	
Awards	
Further Information	<p>Subscription to the full version of the software costs 150€ per year https://www.youtube.com/watch?time_continue=2&v=nKQzas5PmFU</p>
Tags	Agtech, Fleet Management

⁵¹ <https://samsys.fr/index.html> (retrieved 4.9.2019)

⁵² See <https://samsys.fr/index.html> (retrieved 4.9.2019)

Project/Company	365FarmNet GmbH
URL	https://www.365farmnet.com
Contact	
E-Mail	info@365farmnet.com
State	Berlin/Germany
Pitch	“365FarmNet – the innovative software solution for your entire agricultural holding. With 365FarmNet, the free field mapping service, you can manage the whole of your agricultural business from manufacturers to every branch of the industry from home or when you are out and about. You will find all the information on your business clearly set out in a single programme, from cultivation planning to harvest, from field to stable, from documentation to operating analysis.” ⁵³
Product/Service	365FarmNet, CLAAS Crop View
General Information	365FarmNet is a holistic software-based service provider, supports farmers in all aspects of farm management. The 365FarmNet component “CLAAS Crop View” allows identification of differences in vegetation and creation of application maps. It processes raw data from the Sentinel-2 satellite. Farmers are supported in their decisions regarding optimised measures for subplots. CLAAS Crop View also provides an entry to precision farming, by following the growth development of the field crops and comparing fields based on the average vegetation development. ⁵⁴
Partner	CLAAS
Stage	Seed
Target Group/Sector	Farmer
Funding	
Awards	
Further Information	Basic product is for free. Business model is to sell additional services with 365FarmNet (fertilizer services, crop view for plant count,...)
Tags	Precision Farming, Aerial Photography

⁵³ <https://www.365farmnet.com/en/> (retrieved 4.9.2019)

⁵⁴ See https://www.365farmnet.com/en/product/components/crop-management/claas-cropview/?utm_campaign=generic&utm_medium=social&utm_source=facebook&cHash=6aa93203d8ac1e7a22e41c1704fa3732 (retrieved 4.9.2019)

Project/Company	FARMAFACTS GmbH
URL	https://www.nextfarming.de
Contact	Wolfgang Angermair (CEO)
E-Mail	info@nextfarming.de
State	Pfarrkirchen/Germany
Pitch	<p>“Since 1985 we have been programming agricultural software solutions for IT-savvy farmers and developers with a strong link to agriculture. This long-standing experience together with our competent employees has made us a market leader. As the expert in agricultural software, we also offer supplementary products and services.</p> <p>We combine our portfolio of software, complementary products and services for your success to efficiently provide you with even more comprehensive solutions, and we continue to work on interconnecting our products: AO Agrar-Office and all other products and services will now become NEXT Farming! The functions and usability of AO Agrar-Office – now NEXT FarmingOFFICE – remain the same.”⁵⁵</p>
Product/Service	NextFarming Office, Live, App, Service and Package
General Information	<p>FarmFacts, presents their farm management services under the brand “NEXT Farming”. In a function called “Prescription Map Centre” farmers can create individualized, site-specific sowing, fertilizer spreading and crop protection measures maps. These prescriptions make use of Sentinel maps and derived information (e.g. yield estimation/prediction; observations of crop development) which are tied in via WMS from other value-added service providers such as from the German supplier Vista (operator of food security TEP). The FarmFacts company is a BayWa subsidiary and based in Bavaria.</p> <p>Software solutions for following fields are provided:</p> <ul style="list-style-type: none"> • Site-specific crop management • Successful business administration • Needs-based fertilisation • Comprehensive services • Diligent field monitoring • Efficient livestock farming • Smart machine management • Accurate surveying • Simple documentation ⁵⁶
Partner	Vista
Stage	Seed
Target Group/Sector	Farmer
Funding	BayWa founded in 1923
Awards	
Further Information	https://www.youtube.com/channel/UCS7pNc9ZT4xyW4Pek_2iZQ
Tags	Precision Farming, Ag Tech

⁵⁵ <https://www.nextfarming.com/products/> (retrieved 4.9.2019)

⁵⁶ See <https://www.nextfarming.com/solutions/site-specific-crop-management/> (retrieved 4.9.2019)

Project/Company	RESONON
URL	https://resonon.com/
Contact	
E-Mail	inquiry@resonon.com
State	Bozeman/USA
Pitch	"Hyperspectral Imaging Systems; Complete systems for laboratory, outdoor, and airborne remote sensing applications, as well as custom hyperspectral machine vision systems." ⁵⁷
Product/Service	Resonon hardware (Pika cameras), Spectronon
General Information	Resonon is a distributor of hyperspectral cameras, as well as Spectronon, a software solution for data acquired with their hardware. Spectronon is able to control Resonon cameras and correct dark noise, illumination and sensor response. It also includes data analysis functions like the calculation of hyperspectral vegetation indices, cropping and smoothing the pictures. Another feature is that it also allows for user-written plugins. There are applications for the data, provided by Spectronon, like Food Analysis, Biotechnology, Environmental Monitoring, Remote Sensing and Precision Agriculture. In precision agriculture the hyperspectral imaging enables farmers to identify weeds, health conditions and the degree of ripeness of fruits. ⁵⁸
Partner	
Stage	Founded 2002
Target Group/Sector	Farmer
Funding	Non equity assistance
Awards	
Further Information	https://www.youtube.com/channel/UCOsX5flepsZgJlD3Y0tNP1A
Tags	Hyperspectral, Remote Sensing

⁵⁷ <https://resonon.com/> (retrieved 4.9.2019)

⁵⁸ See <https://resonon.com/applications> (retrieved 4.9.2019)

Project/Company	DATAVÄXT AB
URL	https://cropsat.com/
Contact	Mattias Andersson (senior sales manager)
E-Mail	ma@datavaxt.se
State	Hyringa/Sweden
Pitch	“CropSAT is a tool for viewing your field from satellite. Maps of the biomass variation within the field is calculated from satellite data. You can use the variation maps to follow the crop development during the season and to control your N application based on crop N need. With the interactive CropSAT application you can easily create variation maps from the satellite image vegetation index. The maps can be downloaded and used for variable rate nitrogen application. Simply put, CropSAT is a crop sensing system for everybody.” ⁵⁹
Product/Service	Cropsat
General Information	CropSAT can be used to visualise the crop biomass variation within fields. The information from satellite imagery can directly be translated to fertilization or pest control applications, where it is needed the most. Customers can also make a prescription file for controlling the rate of your spreader or sprayer. If the customer lacks the equipment to control the rate, he can use the feature Position Data in DataVäxt mobile app, to show the variation map and the target rate for the current position (according to the variation map). This way DataVäxt manages to make the benefits of modern agricultural technology available to farmers without state-of-the-art machinery. The variation map can also simply be printed, and the rate is then manually adjusted. The imagery, on which the features are based on is provided from different satellites, currently from the satellites DMC, Sentinel-2 and Landsat 8. ⁶⁰
Partner	
Stage	
Target Group/Sector	Farmers
Funding	
Awards	
Further Information	Other products like Logmaster, Signaler, hardware solutions,...
Tags	Agtech, Sentinel

⁵⁹ <https://cropsat.com/> (retrieved 4.9.2019)

⁶⁰ See <https://cropsat.com/#collapse9358319937343990> (retrieved 4.9.2019)

Project/Company	EOMAP GMBH & CO. KG
URL	https://www.eomap.com/
Contact	Thomas Heege (founder)
E-Mail	info@eomap.de
State	Seefeld/Germany
Pitch	“We create digital geospatial information to address the global, regional and local challenges of governments, engineers and policy makers. Our core mapping competence comes from mapping and monitoring aquatic environments worldwide, where we are established as a leading data provider.” ⁶¹
Product/Service	Earth Observation and Environmental Services
General Information	EOMAP core competence lies in the analysis of limnological and shallow sea habitat parameters. ⁶²
Partner	
Stage	founded 2006
Target Group/Sector	
Funding	Approx. 100 000 (€)
Awards	
Further Information	other products: shallow water surveys, inland water quality analysis, habitat baselines and seamless digital elevation models https://www.youtube.com/channel/UCB7jjJtzWBxQhEol-vADMpw
Tags	Geospatial Data, Mapping Services

⁶¹ <https://www.eomap.com/> (retrieved 4.9.2019)

⁶² See <https://www.eomap.com/> (retrieved 4.9.2019)

Project/Company	PICTERRA
URL	www.picterra.ch
Contact	Pierrick Poulenas (CEO)
E-Mail	
State	Chavannes/Switzerland
Pitch	<p>“Optimize your crop management workflow and get the best yield out of your field by leveraging aerial mapping and AI technology.</p> <p>No one knows your field and your crops better than you. Picterra helps you scale up your expertise to assess the health of each of your plants accurately. You can count and scout your crops for inventories, detect weeds or localize stressed or dying crops for replanting management. Moreover, you can quickly assess damages after natural hazards or diseases.”⁶³</p>
Product/Service	Picterra Precision Agriculture
General Information	Picterra Precision Agriculture provides satellite data-based plot, crop and weed detection. The use of the platform is claimed to result in a cost-effective way to enhance the customers expertise for precision agriculture. There’s a special function for specialized vineyard analysis, able to detect vine plants, localize missing plants, and extract plant vigor. ⁶⁴
Partner	We Robotics, Innovaud, Swiss Space Center
Stage	Seed founded 2016
Target Group/Sector	Farmers
Funding	Approx. 100 000 (CHF)
Awards	
Further Information	Other products for aerial service providers, financial services, Insurance, Journalism, NGOs and Humanitarian Sector, Real Estate and Utilities and Infrastructure https://www.youtube.com/channel/UCqhX4AkDk4pdBFECW-GoCw
Tags	Computer Vision, Artificial Intelligence, Drones, Machine Learning

⁶³ <https://picterra.ch/industries/precision-agriculture/> (retrieved 4.9.2019)

⁶⁴ See <https://picterra.ch/industries/precision-agriculture/> (retrieved 4.9.2019)

Project/Company	IBF Servizi S.p.a.
URL	https://www.ibfservizi.it/
Contact	Federico Vecchioni – CEO B.F. S.p.a.
E-Mail	info@ibfservizi.it
State	Jolanda di Savoia/Italy
Pitch	IBF Servizi is a joint program of the ISMEA (Institute for agricultural and food market services) and the biggest Italian agricultural company, Bonifiche Ferraresi. The programs strategic objectives are to improve upon the quality and competitiveness of Italian agriculture. At the same time a reduction of the environmental impact and cost should be achieved. ⁶⁵
Product/Service	Servizio 360 gradi
General Information	<p>IBF Servizi S.p.a. claims to provide an all-round precision agriculture service for farmers. They provide reliable decision support, tested in large scale agricultural enterprises for 53 crops, to smaller farmers. Their procedure goes as follows.</p> <ol style="list-style-type: none"> 1. Analysis of soil property and variability on the basis of soil maps, historic crop-yield-data,... 2. Processing of precise property maps – result are maps optimized for agricultural machinery centred management approach 3. Management – models are calculated, resulting in different crop and management recommendations for the field 4. Monitoring during the growth cycle of the crop, data from satellite or UAVs is collected to provide the farmer with real time information, in order to enable the farmer to quickly adapt his management 5. Traceability of crop management – further data for coming years 6. Evaluation of the crop yield goals, the real crop yield and planning of resulting interventions ⁶⁶
Partner	Bonifiche Ferraresi, ISMEA, (Istituto di Servizi per il Mercato Agricolo Alimentare)
Stage	Founded in 2017
Target Group/Sector	Farmers
Funding	
Awards	
Further Information	<p>https://www.startmag.it/innovazione/cosa-fara-leonardo-finmeccanica-nellhub-tecnologico-per-lagricoltura-di-precisione-ibf-servizi/ Service is already implemented on an area of over 6500 hectare of Bonifiche Ferraresi.</p>
Tags	Precision Agriculture, UAV, Aerial Photography, Satellite Data

⁶⁵ <https://www.ibfservizi.it/chi-siamo/> (retrieved and translated 1.10.2019)

⁶⁶ See <https://www.ibfservizi.it/servizio-360/> (retrieved and translated 1.10.2019)

Project/Company	PIX4D SA
URL	https://www.pix4d.com/
Contact	Christoph Strecha – founder
E-Mail	info@pix4d.com
State	Lausanne/Switzerland
Pitch	“Precision agriculture mapping using images from drones and UAVs The only drone mapping software for agriculture created with the help of farmers, breeders and agronomists.” ⁶⁷
Product/Service	Pix4Dmapper, Pix4Dbim, Pix4Dcapture, Pix4Dfields, Pix4Dreact, Pix4Dsurvey, Crane Camera
General Information	<p>PIX4D SA provides services to a wide range of sectors, spanning from educators and public safety management to mining and construction industries. The product they address to Farmers is called Pix4Dfields.</p> <p>Pix4Dfields accompanies farmers along their whole path towards state-of-the-art digital farming. Beginning at the capturing of images using a drone and standard RGB or selected multispectral cameras with their Pix4Dcapture application. PIX4D provides a variety of tools for various causes to farmers. Pix4Dfields provides software to refine the raw drone data into vegetation index maps, illustrated field boundaries, zonation apps and other maps providing the basis for modern agronomical management as well as operational data for modern agronomical machinery.⁶⁸</p>
Partner	
Stage	Founded in 2011, Seed
Target Group/Sector	Farmers, mining industries, construction industries, educators
Funding	Approx 2,5 Mio (\$)
Awards	
Further Information	<p>All papers, published by PIX4D https://support.pix4d.com/hc/en-us/articles/360000235026-Advanced-knowledge-Scientific-papers;</p> <p>Youtube channel: https://www.youtube.com/channel/UCXHBqjCbv1wj_-itfvpVNIA?sub_confirmation=1</p>
Tags	Photogrammetry, LIDAR, Computer Vision, Drones, Geospatial, Image Recognition, Robotics, Software

⁶⁷ <https://www.pix4d.com/product/pix4dfields> (retrieved 6.10.2019)

⁶⁸ See <https://www.pix4d.com/product/pix4dfields/outputs> (retrieved 6.10.2019)

Project/Company	Farmbot Australia Pty Limited
URL	http://farmbot.com.au/
Contact	Craig Hendricks – founder
E-Mail	info@farmbot.com.au
State	Victoria/Australia
Pitch	<p>“As a farm owner or manager, you need to know what is going on around your farm at any given time. Knowledge gives you peace of mind and enables you to better plan the day ahead. Farmbot gives you knowledge.</p> <p>Our remote monitoring solutions provide you with an accurate and reliable snapshot of all your water sources so you can:</p> <ul style="list-style-type: none"> • Detect leaks and faults in real-time • Save on fuel and labour costs • Better plan your day • Have peace of mind “⁶⁹
Product/Service	Water monitoring, Weather monitoring, Farm monitoring
General Information	<p>The Farmbot Water management aims at replacing water runs and manual water inspections. Those are, especially in remote farming areas, a big cost factor. Farmbot developed monitors that provide the Farmer with data on water levels, system faults and leaks, usage trends and reticulation performance of a water reservoir. The monitors are easy to install and they work anywhere through satellite or 4G connectivity.</p> <p>For Weather management Farmbot provides a weather monitor with an included rain gauge. The weather monitor provides real time, highly precise rainfall data, farm microclimate models, flooding and stock loss risk as well as probabilities for erosion. The included self-drainage function makes the rain gauge low maintenance and therefore especially suitable for remote locations.</p> <p>The Farm management consists of 3 specific monitors. A water flow monitor, providing accurate flow rates from pumps bores and tank in- and outlets, a water pressure monitor, to control the pressure of any line up to 25 bar (be it gas, water or other liquids) and a safety monitor, to ensure the farmers safety around the property. The safety alarm provides the farmer with SOS alarm via satellite or cellular connection in case of extreme weather conditions or technical malfunctions.⁷⁰</p>
Partner	
Stage	Founded in 2014
Target Group/Sector	Farmers
Funding	Approx 90 000 (\$)
Awards	
Further Information	https://twitter.com/farmbot_tech
Tags	Precision Agriculture, Water Management

⁶⁹ <http://farmbot.com.au/> (retrieved 6.10.2019)

⁷⁰ See <http://farmbot.com.au/products/water-monitoring/> (retrieved 6.10.2019)

Project/Company	Agrostar
URL	agrostar.in
Contact	Shardul Sheth - founder
E-Mail	info@agrostar.in
State	Maharashtra/India
Pitch	<p>“AgroStar is India’s foremost AgTech start-up working on the mission of #HelpingFarmersWin by providing a complete range of agri solutions at the fingertips of farmers. AgroStar’s tech platform provides a combination of agronomy advice coupled with service and agri input products that enable farmers to significantly improve their productivity and income.</p> <p>We use an extensive amount of data, technology and agronomy knowledge to give the right solutions (advice+products) to Indian farmers.” ⁷¹</p>
Product/Service	Customized solutions to improve farm productivity, Agrostar Farmer App
General Information	<p>Agrostar aims to solve traditional farmer’s problems by making a wide range of quality products and services available. Agrostar’s Agri Doctor provides the farmer with a possibility to react to pests with the help of real time expert advice, as well as a convenient delivery service for pesticides.</p> <p>The Agrostar Farmer App provides a store in the application, relevant and customized agri-content for pests, farm management. ⁷²</p>
Partner	US Agriseeds, Bayer, Monsanto, BASF,...
Stage	Founded in 2008, Late Stage Venture
Target Group/Sector	Farmers
Funding	Approx 42,4 Mio (\$)
Awards	
Further Information	App: https://play.google.com/store/apps/details?id=com.ulink.agrostar
Tags	Precision Agriculture, Pest Treatment

⁷¹ https://corporate.agrostar.in/?_gl=1%2A26ae0j%2A_ga%2AYW1wLWJDWnNTMmi2OW1MVTZmbC1KUmpjQmc.#about (retrieved 6.10.2019)

⁷²See https://corporate.agrostar.in/?_gl=1%2A26ae0j%2A_ga%2AYW1wLWJDWnNTMmi2OW1MVTZmbC1KUmpjQmc.#about (retrieved 6.10.2019)

Project/Company	Aggrigator
URL	www.aggrigator.com/
Contact	Benjamin Warr - founder
E-Mail	info@aggrigator.com
State	California/USA
Pitch	<p>“eCommerce for Fresh Produce</p> <p>Building the eCommerce infrastructure including ordering, inventory management, transportation, and invoicing can be expensive, but is necessary to compete in today's market. Aggrigator is a new paradigm in Farm to Shelf Marketplaces that goes beyond the online buying and selling of produce. Aggrigator also delivers the tools to efficiently manage a small food hub. This includes everything from crop planning, inventory forecasting, inventory aging, tracing, delivery route optimization, invoicing, and analytics, all built for the small to medium farm and food hub. Allowing you to be in control and confident that you are delivering the freshest produce every day.” ⁷³</p>
Product/Service	Aggrigator buy local; Aggrigator sell direct
General Information	Aggrigator is a B2B solution for mainly small farmers and gastronomy as well as grocers. The heart of Aggrigator’s innovation is their integrated market approach. By bringing together supply and demand in the form of small farmers and buyers of various sorts. Aggrigator, calling itself a network orchestrator, aims at cutting the middle men and their earnings out of the equation. The result of this practice is an aggregated farm-to-shelf-marketplace. ⁷⁴
Partner	Trader Joes, Whole Foods Market, good eggs
Stage	Founded in 2015
Target Group/Sector	Farmers
Funding	Approx 3,3 Mio (\$)
Awards	
Further Information	https://www.youtube.com/channel/UCZ3p5SoAXkRmVxAGQLG7mpQ
Tags	Marketplace, Local Produce, Love Of Local

⁷³ <http://www.aggrigator.com/deliver-fresh-1> (retrieved 6.10.2019)

⁷⁴ See <http://www.aggrigator.com/aggregate-farming> (retrieved 6.10.2019)

Project/Company	Strider LLC
URL	strider.ag/en/
Contact	Carlos Neto - founder
E-Mail	contact@strider.ag
State	Minas Gerais/Brazil
Pitch	“Strider develops digital solutions that truly impact farm management and harvesting practices. Farm machinery management, pest control, productivity estimates and crop planning, we deliver simple, accurate and reliable analyses for you to make the right decision at the right time. The most important thing is to be able to increase productivity – not only for current crops but for those about to grow in the near future.” ⁷⁵
Product/Service	Strider
General Information	<p>Strider provides management planning services for 5 major crops, cultivated in moderate and tropical climate. Soy, Coffee, Sugar Cane, Cotton and citrus. In addition, Strider has products for labor force-, quality-, and machine park management.</p> <p>The decision support systems for the mentioned crops includes functions like:</p> <ul style="list-style-type: none"> • the various map services for parameters like plantgrowth • a tracking system for agronomical machinery • simplification of certification processes (UTZ, Rainforest Alliance,...) • pestcontrol • quality improvement of spray applications • harvesting procedure optimization ⁷⁶
Partner	Metos, John Deere Operations Center, Trimble
Stage	Founded in 2014
Target Group/Sector	Farmers
Funding	Approx 3,8 Mio (\$)
Awards	
Further Information	https://www.youtube.com/channel/UCRz0UrdGIsbPAG7E4vs8Ogw
Tags	Precision Agriculture, Pest Control , Machine Application

⁷⁵ <https://strider.ag/en/> (retrieved 7.10.2019)

⁷⁶ See <https://strider.ag/en/solutions/sugar-cane/> (retrieved 7.10.2019)

Project/Company	Agrologies
URL	www.agrologies.com
Contact	Eleni Kavallieratou - founder
E-Mail	info@agrologies.com
State	Attaki/Greece
Pitch	<p>“Globally, agriculture accounts for around 70% of water used today. It is also the main source of water pollution from excess nutrients, pesticides, and other pollutants. With the increasing population, droughts, and global warming, the competition for water has only gotten higher. as nearly 80% of the developing world relies on small farm holdings for the majority of their food. In an FAO report, smallholders produce 60-80% of the total food consumed and generate approximately 40-60% of total rural income.</p> <p>By introducing automations in agriculture, we aim to Help farmers manage irrigation via their smartphone, anyplace, anytime.”⁷⁷</p>
Product/Service	Agrologies App, Central Unit, Electrovalve Controller, Soil Sensor Kit, Meteo Station
General Information	The Agrologies App aims at being a decision support system for farmers, when it comes to water management. It doesn't take any control out of the farmers hands, but based on information from a variety of Agrologies hardware solutions, like valve controllers, soil sensors and a weather station, the farmer should feel more confident and evidence based in adapting the water management. Furthermore farmers can do so in real time through a click of a button in the mobile Agrologies App. ⁷⁸
Partner	Nova Agricultura, seeds and chips, e nnovation,
Stage	Founded in 2014
Target Group/Sector	Farmers
Funding	Approx 10 000 (€)
Awards	2017: SaC award, "Farming Of Tomorrow - Best Innovation In Farming" 2018: StartUp Europe Awards, "Agritech Category Greek Winner"
Further Information	https://twitter.com/agrologies https://www.youtube.com/channel/UCePZhXg7IFTFPdzuaqiLTg
Tags	Precision Agriculture, Agritech, Water First, Foodinnovation

⁷⁷ <https://www.agrologies.com/products> (retrieved 7.10.2019)

⁷⁸ See <https://www.agrologies.com/products> (retrieved 7.10.2019)

Project/Company	AGRALOGICS
URL	https://agralogics.com
Contact	Sumer Johal – founder and CEO
E-Mail	info@agralogics.com
State	California/USA
Pitch	“Our company mission is to attack, capture and subdue every hard data problem in agriculture so that the end user can avoid all the pain, and we can provide easy, effective, and affordable information solutions to the ag community at all levels of the ecosystem. We are investing in domain experts and automated software to aggregate all the data available and required to support ag production management, and provide it to you in one location. Where the county, growers association, water district, university, state agency, and federal agencies leave off we will pick up and will turn that data into information to drive management actions in the field and the office.” ⁷⁹
Product/Service	Agralogics Collaboration Platform
General Information	Agralogics states, that all information to make a farmer’s life easier is already existing. Agralogics wants to collect, organize and present this information to farmers in a convenient way. The Collaboration Platform enables access to public as well as private data. A farmer can also identify his or her acres in the app to later analyse, organize and take action using insight derived from the data. Agralogics also includes a variety of helpful visualizations for acres and a possibility to create an activity log, including photos and documents for a better recording practice. ⁸⁰
Partner	Morgan Stanley, riverbed, Teradata, intuit, google
Stage	Founded in 2013
Target Group/Sector	Farmers
Funding	Approx 180 000 (\$)
Awards	2017: SaC award, "Farming Of Tomorrow - Best Innovation In Farming" 2018: StartUp Europe Awards, "Agritech Category Greek Winner"
Further Information	
Tags	Geospatial, Artificial Intelligence, Information Technology

⁷⁹ <https://agralogics.com/category/blog/> (retrieved 8.10.2019)

⁸⁰ See <https://agralogics.com/> (retrieved 8.10.2019)

Project/Company	Agworld Inc.
URL	https://www.agworld.com/us/
Contact	Doug Fitch – founder and CEO
E-Mail	support@agworld.co
State	California/USA
Pitch	“The Agworld platform allows all users to collect data at every level of their operation and enables them to share this data with anyone that matters to them. In practice, this means that growers, farm hands, agronomists, input providers, contractors, banks, accountants, land owners and many other stakeholders are able to all work together on the same set of data. Everyone can collect new data and access all other data they have been given access to.” ⁸¹
Product/Service	Row crops management software, Permanent crops management software
General Information	<p>Agworld uses Copernicus program data of the Sentinel 2 satellites. The company Satamap provides Agworld with this data. The two separate crop management services, one for row crops and another permanent crops provide following functions:</p> <ul style="list-style-type: none"> • helpful sentinel data visualization • field scouting • remote expert advice • cash flow monitoring • spray records • precision prescriptions • administrative support for certifications • financial planning ⁸²
Partner	John Deere, SanDisk, Slingshot, Satamap
Stage	
Target Group/Sector	Farmers
Funding	
Awards	
Further Information	https://www.smartcompany.com.au/startupsmart/advice/startupsmart-growth/agworld-secures-6-million-series-c-funding-with-plans-to-expand-to-north-america/
Tags	Precision Agriculture, Sentineldata, Earth Observation

⁸¹ <https://www.agworld.com/us/about/> (retrieved 8.10.2019)

⁸² See <https://www.agworld.com/us/growers/row-crops#pre-season> (retrieved 8.10.2019)

Project/Company	AEGRO
URL	www.aegro.com.br
Contact	Paulo Silvestrin - founder
E-Mail	contato@aegro.com.br
State	Rio Grande do Sul
Pitch	“Aegro software brings together the operational and financial areas of your farm to give you efficient control of rural management. Each purchase note generates an expense on your financials and adds an input to your inventory. The inputs will be used through activities that you record while in the field. Then, when you arrive at the end of the cycle and record your harvest, Aegro will crosscheck this information to generate the crop costs and profitability of each field.” ⁸³
Product/Service	Aegro Software and Mobile App
General Information	<p>Aegro software is designed for profit optimization. The main functions of Aegro can be organised in the following fields and functions:</p> <ol style="list-style-type: none"> 1. Asset Management and Machinery <ul style="list-style-type: none"> • Machinery Management • Wealth Management 2. Financial Management and Marketing <ul style="list-style-type: none"> • Cash Flow Analysis • Stock Management • Production and Storage Management • Sales Control 3. Integrated Pest Monitoring <ul style="list-style-type: none"> • Pest monitoring • Pest incidence maps 4. Agricultural Operations <ul style="list-style-type: none"> • Harvest Planning • Crop Cost Control • Climate Models for the fields <p>In addition, the Aegro product portfolio also includes a free mobile app. The farmer can access selected data and record all your activities right away.⁸⁴</p>
Partner	
Stage	Founded in 2014
Target Group/Sector	Farmers
Funding	Approx 2,7 Mio (\$)
Awards	
Further Information	https://www.youtube.com/channel/UCFhEvVp1JKWNI8-eGzjxOYw
Tags	Precision Agriculture, Big Data, Machinery Management

⁸³ <https://www.aegro.com.br/> (retrieved and translated 8.10.2019)

⁸⁴ See <https://www.aegro.com.br/> (retrieved and translated 1.10.2019)

Project/Company	AGRIVI d.o.o.
URL	www.agrivi.com
Contact	Matija Zulj – founder
E-Mail	info@agrivi.com
State	England/UK
Pitch	“Agrivi farm management software lets you plan, monitor and analyze all activities on your farm easily. Tillage, planting, spraying, fertilization, irrigation, harvesting and all other activities are managed with a few clicks. Powerful farm analytics let you make the right decisions at the right time. Say no to gut-feeling decisions and welcome data-driven farm management.” ⁸⁵
Product/Service	Farm Management, Cooperative Management, Enterprise Farm Management
General Information	<p>Agrivi has three software solutions for farmers, each directed at a certain size of the agricultural operation.</p> <p>Agrivi Farm management supports small farmers with planning monitoring and analyzing farm activities like tillage, planting, plant protection, fertilization, irrigation and harvesting. Other features are weather monitoring and an application for farm economics.</p> <p>The cooperative management software is aimed at cooperatives to achieve risk reduction, centralized efficient task management to increase productivity and software solutions, that should help the farmer implement best practice knowledge under varying conditions.</p> <p>The enterprise farm management has additional functions for customization of existing IT systems as well as premium service and support.⁸⁶</p>
Partner	Bonifiche Ferraresi, ISMEA, (Istituto di Servizi per il Mercato Agricolo Alimentare)
Stage	Founded in 2013
Target Group/Sector	Farmers
Funding	Approx 1,4 Mio (\$)
Awards	
Further Information	https://twitter.com/AgriviCorp
Tags	Precision Agriculture, Agtech, Farm Management

⁸⁵ <https://www.agrivi.com/en> (retrieved 8.10.2019)

⁸⁶ See <https://www.agrivi.com/en/farm-management> (retrieved 8.10.2019)

Project/Company	Benson HILL Biosystems Inc.
URL	www.bensonhillbio.com
Contact	Matthew B. Crisp - founder
E-Mail	info@bensonhillbio.com
State	Missouri/USA
Pitch	<p>“Simply put, there’s no single answer to solving the challenge to nourish the world’s growing population.</p> <p>Here at Benson Hill, we believe the foundation lies in a healthy, sustainable food system rooted in diversity and choice. A variety of crops and product choices, optimized for different growing conditions by a community of innovators who are passionate about food and food production. So, how exactly do we do that?</p> <p>Nature, it turns out, is an incredibly generous and under-utilized source of genetic diversity that can improve food production and quality. We’ve built our company to enable innovators to collaborate and tap this diversity, wherever they may be in the food and agriculture supply chain.” ⁸⁷</p>
Product/Service	CropOS
General Information	<p>CropOS is being presented as a crop design platform, bringing together machine learning, big data analytics and biological knowledge to allow researchers to quickly predict, select and control desirable traits. Thereby saving valuable time and financial means for generations of breeding experimentation.</p> <p>There are 3 major CropOS applications.</p> <ol style="list-style-type: none"> 1) Breed With the power of computational breeding, CropOS predicts varieties that will perform best for the desired trait. In doing so it enables farmers to bring favourable traits to market faster. 2) Edit Through machine learning technology CropOS presents accurate predictions of trait editing targets to innovators. The service is designed for editing with CRISPR technology. 3) Reveal It pools data from public and private sources to efficiently provide innovators with all available data in one place. ⁸⁸
Partner	
Stage	Founded in 2012
Target Group/Sector	Farmers, Breeders, Scientists
Funding	Approx 132,3 Mio (\$)
Awards	
Further Information	https://twitter.com/bensonhillbio
Tags	Precision Agriculture, Biotechnology, Machine Learning, Cloud Computing, CRISPR

⁸⁷ <https://bensonhill.com/food-production-innovator/> (retrieved 8.10.2019)

⁸⁸ See <https://bensonhill.com/design-better-crops-together-benson-hill/crop-improvement-platform-cropos/> (retrieved 8.10.2019)

Project/Company	CiBO Technologies Inc.
URL	www.cibotechnologies.com
Contact	Daniel Ryan – CEO
E-Mail	info@cibotechnologies.com
State	Massachusetts/USA
Pitch	“Infused with differentiated technologies, CiBO delivers high value, objective insights around farmland and its potential. With no dependence on the farmer or local data, CiBO derives unique field-level insights across the agriculture ecosystem. CiBO’s technology evaluates land potential using multiple layers of data, including — satellite, weather, soil, parcel records, and more — and combines it with proprietary AI and science-based simulation.” ⁸⁹
Product/Service	CiBO
General Information	CiBO strives for transparency and efficiency in the agricultural value chain. It does so by enhancing pre-existing data with further simulations, based on their general experience in the field of agriculture. The data used to create CiBO’s insights for farmers consists of satellite data, weather data, climate models, soil property maps, parcel records and more. CiBO combines those various data with its proprietary artificial intelligence. The result is information in the form of actionable insights. Those insights will act as decision support in risk management, land pricing and other agronomical fields. ⁹⁰
Partner	
Stage	Founded in 2015
Target Group/Sector	Farmers
Funding	Approx 30,3 Mio (\$)
Awards	
Further Information	https://twitter.com/CiBOTech/ https://www.youtube.com/channel/UCWDWgs7wIMEVvJ2opN8fr6A
Tags	AgTech, Big Data, Simulation, Artificial Intelligence

⁸⁹ <https://www.cibotechnologies.com/> (retrieved 9.10.2019)

⁹⁰ See <https://www.cibotechnologies.com/> (retrieved 9.10.2019)

Project/Company	TerrAvion Inc.
URL	www.terravion.com
Contact	Cornell Wright - founder
E-Mail	info@terravion.com
State	California/USA
Pitch	<p>“TerrAvion is the largest volume subscription aerial imagery for agriculture provider in the U.S. TerrAvion’s core product is a 13-15 flight cycles per season imagery subscription with a combination of weekly and bi-weekly image deliveries for commodity crops. We provide a package of high-resolution imagery products, including a natural color, infrared, thermal, and vegetation index products, to our customers on a weekly and bi-weekly schedules.</p> <p>For specialty crops, different flight cycle programs are available to optimize the data for the various growing seasons.”⁹¹</p>
Product/Service	Thermal aerial imagery, Normalized Difference Vegetation Index, TerrAvion Mobile App
General Information	<p>By measuring visible red light and near-infrared light TerrAvion can calculate their Normalized Difference Vegetation Index (NDVI): The higher the NDVI value the more chlorophyll is present. Leaf area, as well as photosynthetic activity are positively correlating with the NDVI. The NDVI helps farmers verify whether their managing actions have a positive impact on plant vitality or not.</p> <p>In addition to NDVI TerrAvion also offers thermal imagery. This type of imagery is based on thermography data achieved with TerrAvions fleet of aircrafts, which is later color illustrated. With the thermal imagery it is possible to detect variations in temperature throughout a field. The most important use for thermal imagery is moisture monitoring, as water is one of the most important factors for plant vitality.</p> <p>TerrAvion also provides a mobile application for a more convenient accessibility of TerrAvion data. ⁹²</p>
Partner	John Deere Operations Center, Agrain, EFC Systems, SST Software, Fieldview
Stage	Founded in 2013
Target Group/Sector	Farmers
Funding	Approx 10 Mio (\$)
Awards	
Further Information	<p>https://www.youtube.com/channel/UCUBc_BOAgsA9MLfud7jv6Qw</p> <p>https://twitter.com/TerrAvion</p>
Tags	Precision Agriculture, Developer Tools, Robotics

⁹¹ <https://www.terravion.com/product-info/> (retrieved and 9.10.2019)

⁹² See <https://www.terravion.com/thermal-image-data/> (retrieved 9.10.2019)

Project/Company	Kappazeta Ltd.
URL	www.kappazeta.ee
Contact	Kaup Voormansik - CEO
E-Mail	info@kappazeta.ee
State	Tartu/ESTONIA
Pitch	EU Subsidy Checks, Time Series and Consulting Projects
Product/ Service	ZETA
General Information	<p>We are a science-driven radar remote sensing company and our goal is to make space a valuable asset for everyone! There is an enormous and growing amount of remotely sensed data out there, much of which is largely unutilized. Why? Mostly due to the burden of accessibility, data processing and feature extraction.</p> <p>Seeking to improve the situation, we are offering ready-to-use high quality Sentinel-1 timeseries and change detection services. Sentinel-1 data is the only freely available radar data source which enables global monitoring at parcel scale with a revisit rate of between 3 to 12 days. We are among the very few in the world with the expertise to meaningfully utilize this data using our unique processing chain for radar interferometry. In comparison, optical satellites do not provide as regular and as timely data feed globally as radar satellites due to cloud interference and variable illumination conditions.</p> <p>The key area we focus on is agriculture. With the growing global population there is increasing pressure to produce more food every year, but land suitable for agriculture is at the same time decreasing. We believe that with timely information extracted from satellite data, farmers can make better decisions, earn more profit and ultimately grow better food. In terms of continuous monitoring of large areas on a weekly basis, satellites are by far the best data source.</p>
Partner	
Stage	Growth
Target Group/Sector	Agro Industry, Paying Agencies, Farmers
Funding	
Awards	
Further Information	https://www.f6s.com/kappazeta
Tags	Analytics, Artificial Intelligence, Machine Learning, Consulting