



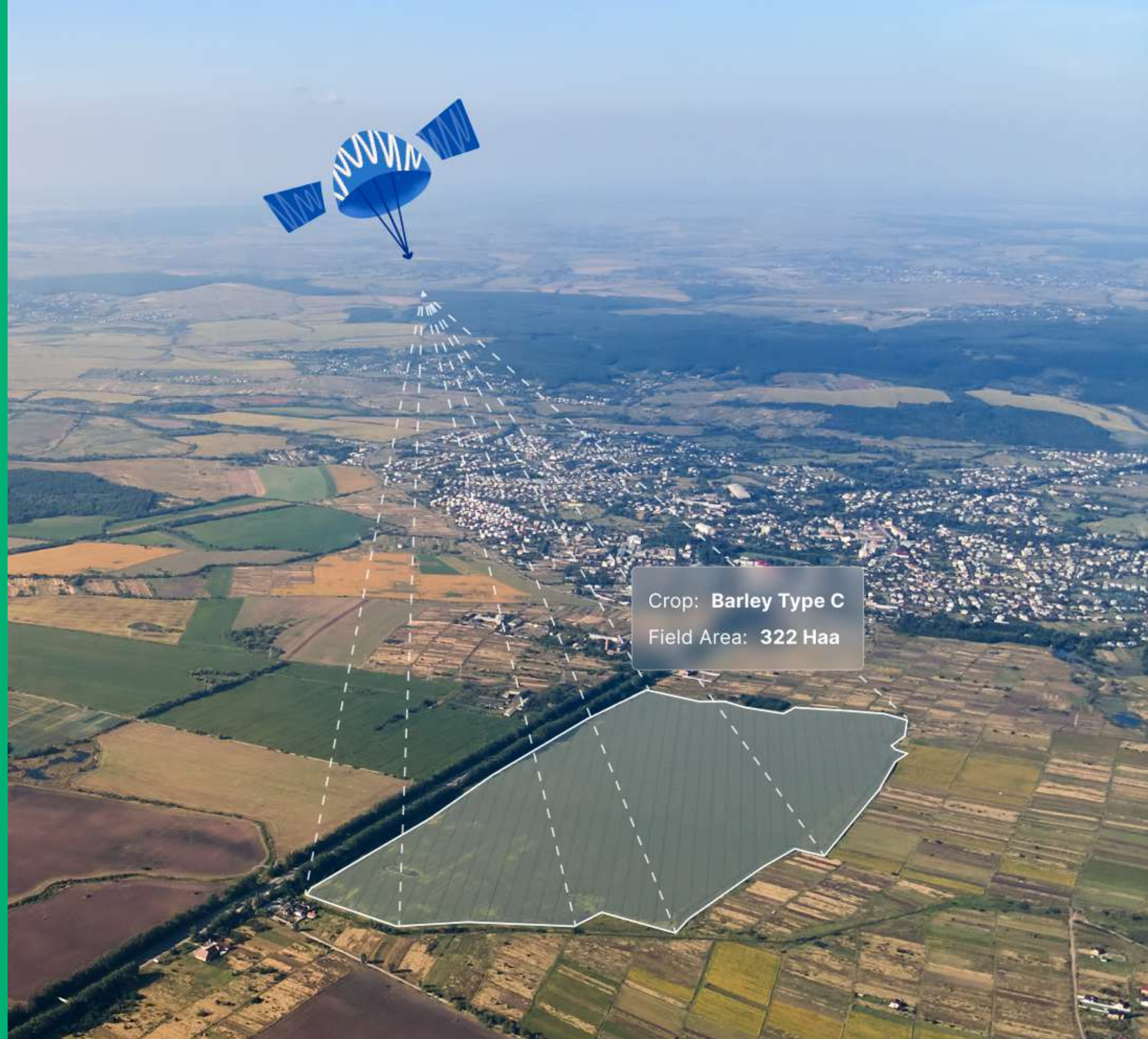
Q2 2022

# From crop to cloud

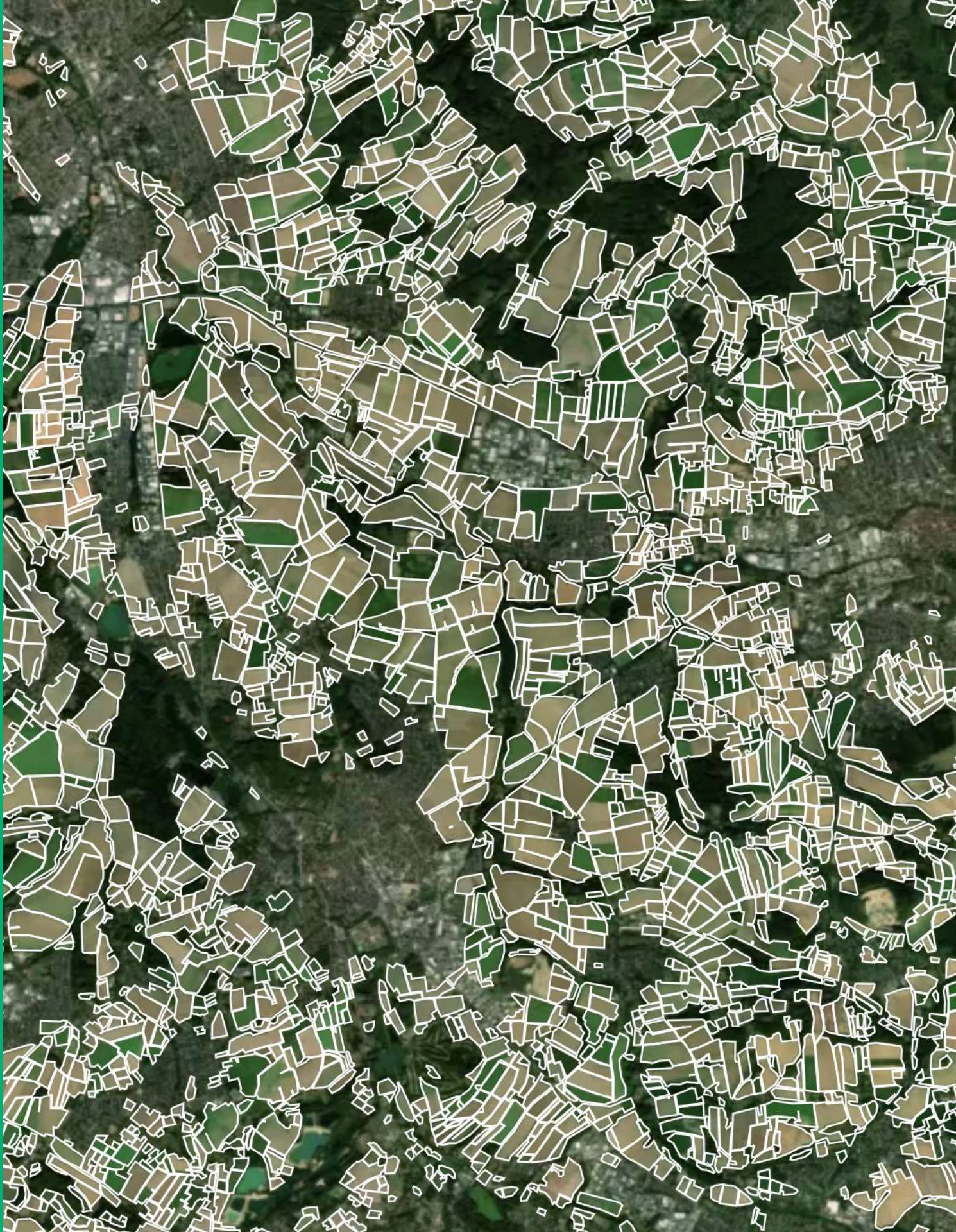
We build agricultural intelligence  
tools to help farming communities  
boost crop yields & optimise  
production

PREPARED BY

**Nils Helset, CEO & Founder**  
**[nils@digifarm.io](mailto:nils@digifarm.io)**



Crop: **Barley Type C**  
Field Area: **322 Haa**



## Who is DigiFarm

**We detect the world's most accurate field boundaries to power precision agriculture.**

DigiFarm is Norway's leading ag-tech startup and has spent the last three years developing the technology for automatically detecting the highest accuracy field boundaries and seeded acres using deep neural network models and super resolved EO-data.

**Our mission is to help organizations in the ag-value chain optimize their production.**



## PRODUCT

# Automatic Field Delineation Model

We have developed a state-of-the-art deep neural network model for Field Delineation (Automatic Detection of Field Boundaries and Seeded Acres) with 10x higher resolution than existing Sentinel-2 at 10m based models, through using our proprietary algorithm for upscaling Sentinel-2 from 10m to 1m resolution. Our model is currently achieving an average accuracy of IoU 0.96+ (Intersection over Union) across multiple international regions.



### Available

### Q2 2022

### Q3 2022

- Norway
- Austria
- Germany
- Belgium
- Italy
- Ukraine
- Czech
- Denmark

- Brazil
- Canada
- Argentina
- Thailand
- Spain
- Netherlands
- France

- All EU-regions
- South Africa
- Kenya
- United States
- Myanmar
- India
- Canada

### 12-15% higher accuracy

Than existing Cadastral map data (LPIS in EU-regions and CLU's in the US) and AI-solutions at 10m resolution

### 6+ years

We can provide Field Delineation Model historically (back to 2015) and in-season including seeded acres

### 0.96 IoU score

Model managed to reach an IoU (Intersection of Union) average accuracy score of 0.94-0.98 for our Field Delineation



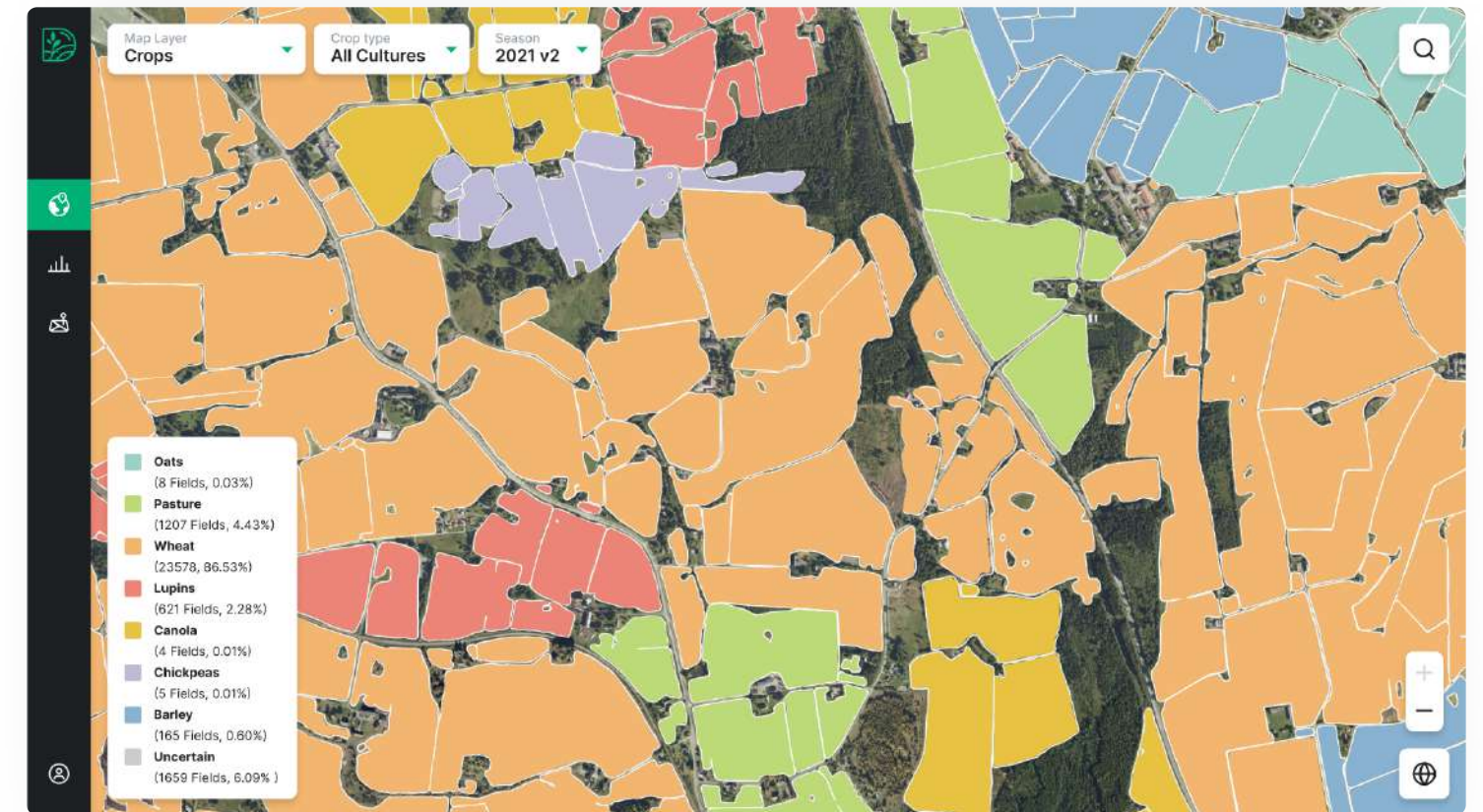
PRODUCT

# Crop Classification Model

Crop Classification Model built on the baseline of crop specific yield-data. The alpha version we released in 2019 achieved a 82-83% accuracy based on single-pixel algorithm (Sentinel-1), while our latest model released in fall 2020 reached an accuracy of 90% based on object-based Sentinel-2 algorithm, due to the increased accuracy of the field delineation model (and seeded acres).

We can detect crop types historically back to 2015 as well as in the growth season, approx. 31-37 on Zadoks scale depending on the region and crop-type. In a Norwegian context we start run the model in the middle of July and achieve our best results in the middle of August, approximately 1.5 months prior to harvesting. Additional Crop Classification Model projects include:

- Crop Classification Model in Western Australia for 2020 season based on Wheat, Barley, Oats and Canola.
- Large-scale Crop Classification Model in India (grapes, onion and sugar cane).
- Small-scale Crop Classification Model in Thailand on sugar cane and rice paddies.
- Large scale Crop Classification Model on "Corn" in Myanmar.



### Up to 90% accuracy

Our latest model released in fall 2020 reached 90% due to the increased accuracy of field delineation model.

### 3k+ Crop-field training data

The Model is built on validated and reliable ground truth data from over 3,000 field level crop seeded data over a 5-year period.

Available now

Q2 - Q3 2022

Norway

Thailand

Australia

India

Myanmar

France

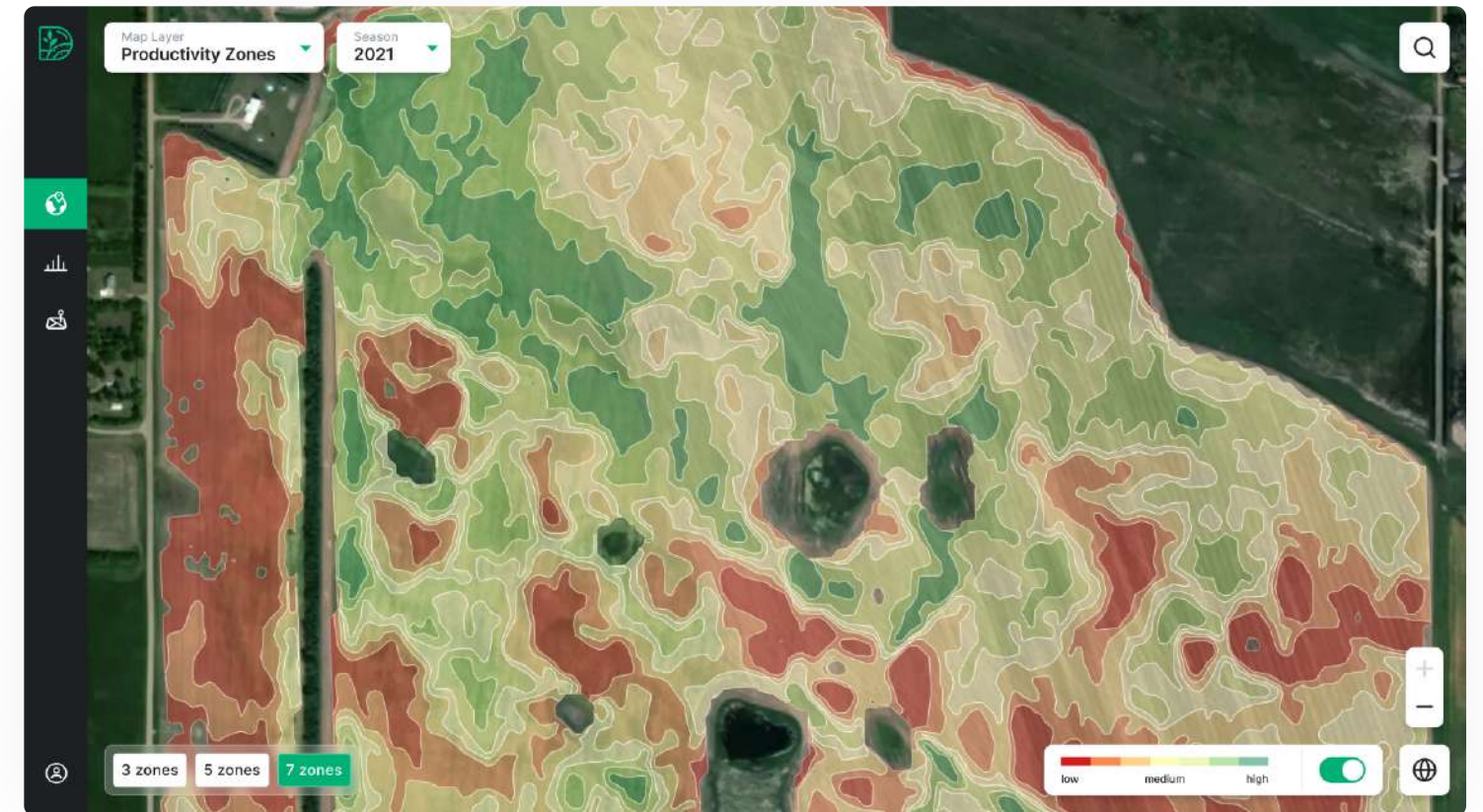
USA (IA/IL)



## PRODUCT

# Productivity Zones

Field Delineation is a prerequisite for a reliable and accurate zoning tool. Our zoning layer will have ability to classify different zones within a field based on low, medium and high productivity zones which enables various precision ag-services (VRT, fungicide/fertilizer) and strengthens in-field analytics. The zoning product is developed through our proprietary algorithm based on 6-year EVI data along with extensive yield and ground truth data in both Norway and Canada. We offer both multi-year zoning (max. 7 years depending on S2 data) where you can choose the number of zones you'd like to query in the API. Single-year zoning is also available.



### Available

#### Q2 2022

#### Q3 2022

Norway	Brazil	All EU-regions
Austria	Canada	South Africa
Germany	Argentina	Kenya
Belgium	Thailand	United States
Italy	Spain	Myanmar
Ukraine	Netherlands	India
Czech	France	Canada
Denmark		

### 6-year+ NDVI/EVI data

The zoning product is developed through our proprietary algorithm based on 6-year NDVI/EVI data.

### Choose number of Zones

In the API you're able to choose the number of Zones you'd like from min. 2 (smaller fields) and max. 7 (larger fields).

### Usage

Easily use to create VRT maps for fertilizing or fungicide application with in-season Zoning maps

### Sustainability Index (coming soon)

Releasing sustainability index on 30+ year of data including S2 and Landsat with NDVI along with Zoning data.



## PRODUCT

# Field sustainability Index

**Multi-year analysis of vegetation indices, such as EVI and NDVI, can give a clear indication of yield trend, and serve as a sustainability of crop production in each field.**

If the EVI / NDVI trend is positive, then the nutrient resources in the field are growing, and crop production in this field is sustainable. If the EVI / NDVI trend is negative, then crop production in this field depletes the field resources, crop yield decreases over the time, soil resources are depleted, and crop production is not sustainable over the time.

This method is similar to monitoring trends on stock market, when fluctuating stocks prices follow up- or downtrend, as indicated by 15-, 50- 200-day moving averages. This method indicates the sustainability trend based on one or multi-year trend.



## Methodology

**First prototype includes automatically delineated field boundaries and seeded acres in Hannover, Germany (40km x 40km) based on super-resolution of 1m per pixel.**

Landsat NDVI calculations for individual fields in Hannover, every single line represents an individual field boundary with individual NDVI values. The chart shows the maximum NDVI average for all infield pixels in each year



PRODUCT

# Deep Resolution Imagery (1m) | Overview

We spent a lot of time developing a deep neural network model that would be able to increase the spatial resolution of Sentinel-2 from 10 meters to 1 meter. We offer Deep Resolution-enhanced multispectral radiometrically and atmospherically calibrated Sentinel-2 images at 1m resolution.

The data is generated on demand and can be provided both retrospectively, starting from January 2018, as well as during current season. Currently, all images with cloud cover under 40% are processed, resulting in 10-40 scenes per year depending on location.

The model is currently achieving sub-meter georeferencing accuracy and sophisticated cloud occlusion and shadow removal methodology to provide you with the optimal source of cloud-free imagery data for your analytics.

### 10x deep resolution

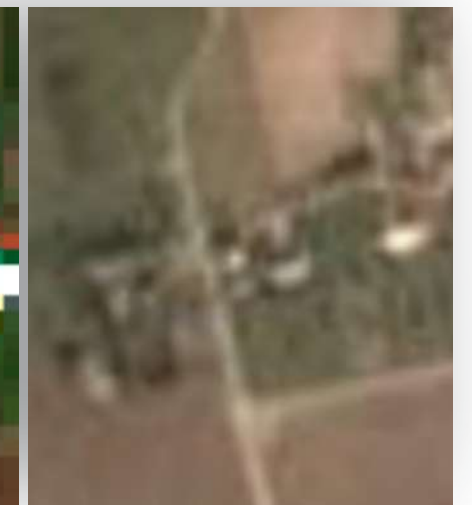
Downscaled from 10 meter resolution to 1 meter per pixel resolution.

### Worldwide

Validated across 17+ countries around the world achieving 1-5m georeference accuracy.

### 300+ mill. hectares

Imagery processed at 1 meter resolution multi-dates across 17 different countries.



DigiFarm S2 1m resolution

Sentinel-2, 10m resolution

PlanetScope, 3-5m



PRODUCT

# Deep Resolution Imagery | Technical Data

- Synthetically super-resolved and augmented satellite imaging at effective 1 m/px spatial resolution derived from Sentinel-2 L2A imaging data
- Regular global coverage from 56° S to 84° N, including 5 years of historical archive. Images of any size are readily available
- Orthorectified and georeferenced nadir imaging data with geopositioning accuracy of submeter to 5 meters
- 4-band (RGB+NIR) radiometrically and atmospherically corrected surface reflectance. Up to 12 band multi-spectral products corresponding to Sentinel-2 specifications are possible

The imaging data enables the reconstruction of spatial features and textures not visible on the original Sentinel-2 data, however some residual morphological artifacts and inaccuracies are potentially expected.

*Images on left: Original Sentinel-2 image (left) and DigiFarm super-resolved 1 m/px image (right)*







## API SANDBOX

# Data Delivery | API | Field Boundaries

We serve our field boundaries data via API with all documentation so you can integrate it directly within your solution. All our products are waiting to be tested.

<https://api-docs.digifarm.io/#9.47/60.746/11.1806>

## 4 query types



### By Field ID

We serve low res (simplified) boundaries inside a bbox or as vector tiles, so they can be displayed on a map in your app. After click the app queries our API with ID of the clicked field. Our API returns the field boundary in high res.



### By Bounding Box

User draws a polygon on a map and our API returns all field boundaries in that bbox.



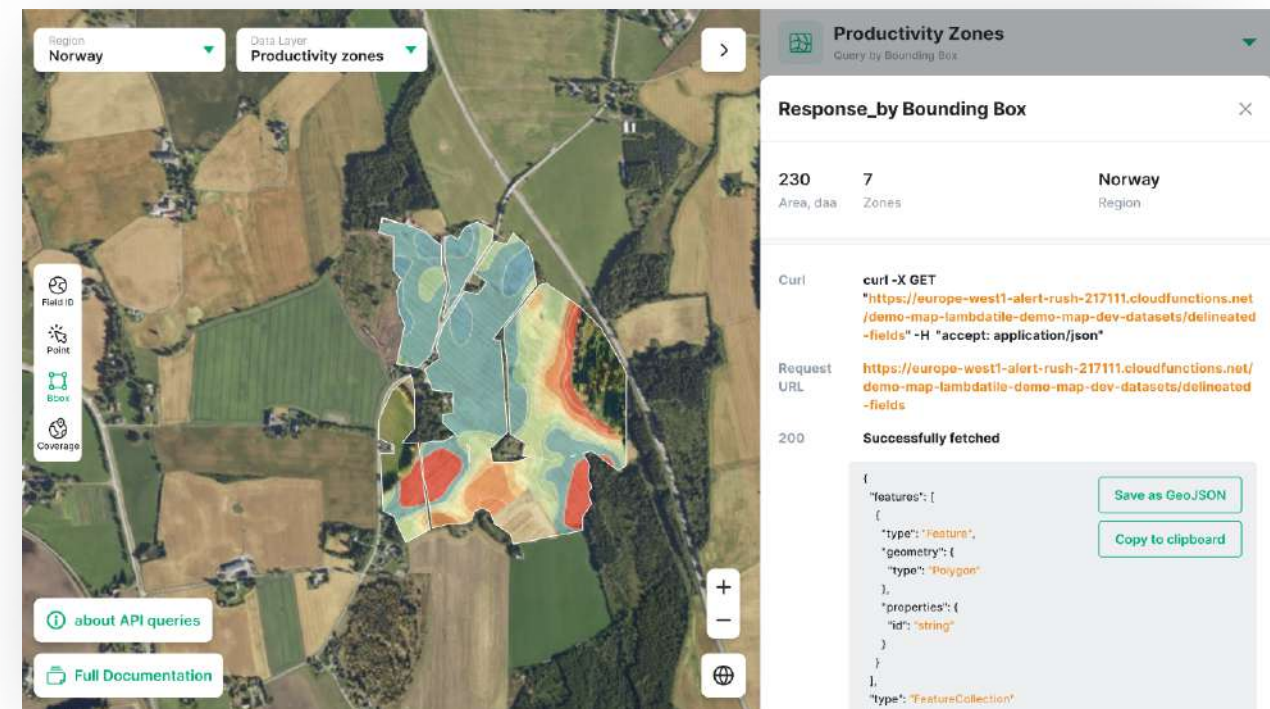
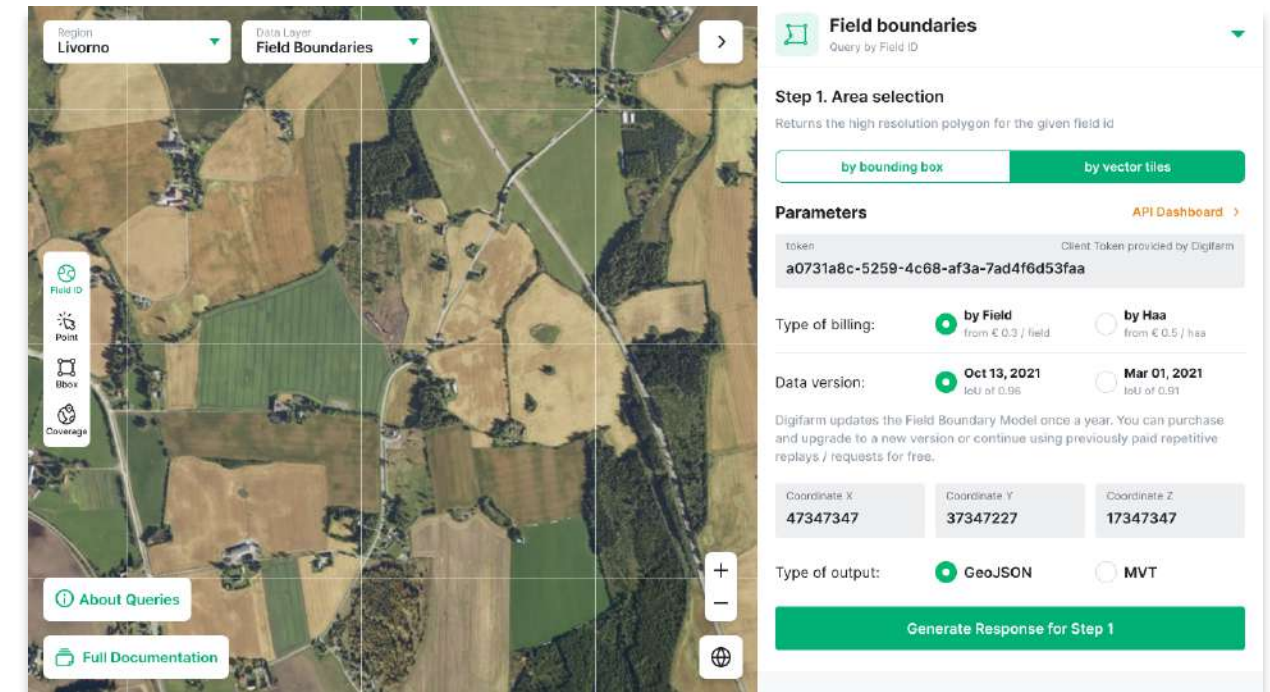
### By Point on the Map

Click on a map in your app, it makes a query to our API with latitude / longitude of the point and our API returns field boundary geojson data around that point.



### By Coverage

Returns worldwide polygons for the areas where selected product is available





## API SANDBOX

# Data Delivery | API | Deep Resolution

We serve the deep-resolution imagery via API endpoints with all documentation so you can easily integrate it directly in your digital solution.

<https://api-docs.digifarm.io/#9.47/60.746/11.1806>

## 3 query types



### By Tile URL

API will serve jpg tiles for the given XYZ coordinates. Based on the query option, RGB, NDVI and EVI images will be served. Start date and End date will enable the users to choose the date of DR image. There will be an optional region parameter to filter based on the geographic region.



### By Coverage

API will return the coverage polygon and details of the Deeply resolved MGRS tiles within the given lat, long bounds. Query params to filter the results based on region and MGRS tiles will be supported.



### By Bounding Box

API will return the TIFF images for a given lat, long bounds. This query too supports image type, region, start and end dates.

**Sentinel-2. DR Images**

**Sentinel 2. Deeply Res. Images**  
Query by Tile URL

**Parameters**

token: Client Token provided by DigiFarm  
**44252MP\_2**

startdate: Processing data from **Apr 10, 2021** | enddate: Processing date till **Sep 5, 2021**

mgrs\_tiles: IDs in format of comma separated list. By default: **All**

tile coordinates: Currently displayed on the map  
**Z:13 X: 60036, 60037, ... Y: 71536, 71537, ...**

image type: **RGB Image**

region: **All Regions**

Raster Tile URL: [https://api.digifarm.io/dr/tiles/512/{z}/{x}/{y}.jpg?startdate=20210810&enddate=20210820&mgrs\\_tiles=all&token=44252MP\\_2](https://api.digifarm.io/dr/tiles/512/{z}/{x}/{y}.jpg?startdate=20210810&enddate=20210820&mgrs_tiles=all&token=44252MP_2)

**Sentinel-2. DR Images**

**Sentinel 2. Deeply Res. Images**  
Query by Tile URL

**Z:13 X: 60036, 60037, ... Y: 71536, 71537, ...**

image type: **RGB Image**

region: **All Regions**

Raster Tile URL: [https://api.digifarm.io/dr/tiles/512/{z}/{x}/{y}.jpg?startdate=20210810&enddate=20210820&mgrs\\_tiles=all&token=44252MP\\_2](https://api.digifarm.io/dr/tiles/512/{z}/{x}/{y}.jpg?startdate=20210810&enddate=20210820&mgrs_tiles=all&token=44252MP_2)

Place this Tile URL into your map framework (Mapbox, Leaflet, Google Maps, etc.)

**Generate Response**

Grid of image thumbnails showing different regions and dates.



PRICING

# Our packages and pricing

Every precision ag-service starts with it's basic field boundaries and seeded acres which is why we work to so hard to achieve the highest possible accuracy, our model's average accuracy is at an IoU of 0.94+.

**We offer four different packages with two pricing options.**

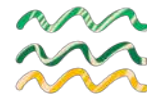


FIELDS

## Basic

Everything you need to get started: Field Boundaries and Seeded Acres

Automatic Field Detection  
Seeded Acres



FIELDS AND ZONES

## Basic + Zones

Looking to determine various in-field productivity zones

Automatic Field Detection  
Seeded Acres  
Multi-year Zoning



FIELDS AND CROPS

## Basic + Crops

Maybe Zoning is not important but Crop Detection is

Automatic Field Detection  
Seeded Acres  
Crop Detection



FIELDS, ZONES, CROPS

## Pro

The Full Monty: Field Boundaries, Crop Detection, Zoning & Acres

Automatic Field Detection  
Seeded Acres  
Multi-year Zoning  
Crop Detection



PRICING

# Pricing table

Pricing based on 1m resolution for all available regions. The bands illustrate both hectares and number of fields.

OPTION 1

Per hectare / year

OPTION 2

Per field boundary / year

## Basic

## Basic + Zones

## Basic + Crops

## Pro

0 - 100,000

€ 0.09 € 0.18

€ 0.11 € 0.22

€ 0.14 € 0.24

€ 0.13 € 0.23

100,000 - 250,000

€ 0.07 € 0.15

€ 0.09 € 0.19

€ 0.12 € 0.21

€ 0.11 € 0.20

250,000 - 500,000

€ 0.06 € 0.12

€ 0.08 € 0.16

€ 0.11 € 0.18

€ 0.10 € 0.17

500,000 - 1 mln.

€ 0.05 € 0.09

€ 0.07 € 0.12

€ 0.10 € 0.14

€ 0.09 € 0.13

1 mln. +

€ 0.03 € 0.07

€ 0.04 € 0.10

€ 0.07 € 0.11

€ 0.06 € 0.11



PRICING

# Pricing table for Add-ons

## Deep resolution imagery

We offer Deep Resolution-enhanced multispectral radiometrically and atmospherically calibrated Sentinel-2 images at 1m resolution. The data is generated on demand and can be provided both retrospectively, starting from January 2018, as well as during current season.

Currently, all images with cloud cover under 40% are processed, resulting in 10-40 scenes per year depending on location.

OPTION 1

Per year (12 months)

OPTION 2

Per single image

Annual area per km2

Price per km2

Annual area per km2	Price per km2	Price per km2
1	€ 320	€ 8
10	€ 80	€ 4
100	€ 40	€ 2
1,000	€ 10	€ 1
10,000	€ 4	€ 0.4
100,000+	€ 1	€ 0.1

## Low res boundaries

We can also serve low res boundaries (~10m) for the single purpose of selecting the high resolution boundaries that each user needs.

Once the zoom level moves above 8 we will serve the low resolution boundaries on the map for free as vector tiles up to 100k requests per month.

Requests

Price

Per 100k Requests / Month	Free
Above 100k Requests / Month	€ 15



# Our history

DigiFarm received grant-funding from Innovation Norway in order to conduct preliminary research on feasibility of creating deep neural network models to help optimize crop-production among crop-producers in Norway.



Q1 2018

Initiate our third R&D project to include the National Agronomical Advisory Organisation (NLR) as a R&D partner in the project.



Q1 2019

Received secondary grant funding from Innovation Norway to accelerate project, in addition to multiple year tax-refund scheme.



Q3 2019

Becomes a part of NCE Heidner Biocluster, Norway's leading Bioeconomy Cluster, Startuplab and Kjeller Innovasjon.



Q1 2020

Becomes a part of the Oracle Startup Cloud Accelerator and the NVIDIA Inception Program,



Q4 2020

Accepted into EU's leading EIT Food Accelerator Network (FAN) batch #4, chosen among 18 other startups from 600 applications



Q2 2021

Accepted into EU-leading accelerator Spinlab (2021 Rootcamp), funded by KWS/K+S. Won the Copernicus Accelerator Pitch Bootcamp and closed grant-funding with ESA and NoSA. Secured EIC Accelerator funding €6M.



Q4 2021

Q3 2018



Our feasibility study led to our first R&D project, grant funded by the Research Council of Norway while partnering with the University of Life Sciences (NMBU).

Q2 2019



Accepted into Google Cloud for Startups and AWS Activate programs, including over 200k USD in cloud credits, supercharging our ability to train multiple different models on GPU-instances.

Q4 2019



First startup to be accepted into the Norwegian ESA BIC program.

Q3 2020



Won the Copernicus Masters "Galileo" Prize of 2020 for Sweden.

Q4 2020



Secures spot in Copernicus Accelerator for 2021, received funding through Copernicus Incubation 2020 and joined Nora.ai.

Q3 2021



Received grant-funding through our partnership with the Norwegian Space Agency and fourth round of soft funding from Innovation Norway, became incubation member in Kjeller Innovasjon. Won Airbus Challenge 2021 (INNOspace), CDL startup member

Q1 2022



Received grant-funding through the Ai4 Copernicus Agriculture to develop automatic weed detection based on our field boundaries and deeply resolved S2. Secured 6 commercial contracts with B2B clients.





## TEAM



# Company Organization

## Core Team



**Nils Helset,**  
Co-founder & CEO



**Konstantin Varik,**  
Co-founder & CTO



**Rohit Shetty,**  
Back-end Engineer



**Yosef Akhtman**  
Head of AI & DR



**Alexei Melnitchouck,**  
Digital Farming &  
Precision Ag Evangelist



**Girish Pallagatti,**  
Fullstack JS Engineer



**Anton Shatsila,**  
Head of Product



**Ishan Trivedi,**  
GIS Engineer



**Anil Nair**  
Back-end Engineer



**Janika Merquita**  
GIS-Engineer

## External Advisory Board



**Sverre Bisgaard,**  
Former Founder & CEO of  
Kongsberg Norspace



**Jørgen Ole Haslestad,**  
Former CEO of Yara



**Dennis Diaconescu**  
B2B Start-up & Product  
Leader



**Åsmund Langeland,** Head  
of Precision Ag-tech,  
Norwegian Ag Advisory



**Linn Dybdahl,**  
Project Leader, NCE Heidner  
Bioeconomy Cluster



**Caspar Olenhusen,**  
AgriFoodTech  
Specialist

### May, 2020

6 Team members

### May, 2021

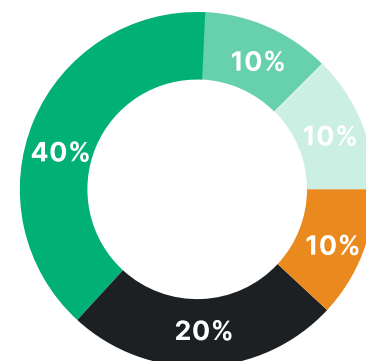
11 Team members

+5

### March, 2022

25 Team members

+14



- Data Science & Software Development
- Sales
- Strategy
- Marketing, Design & PR
- Research & Development



# Partners who trust us

## Clients



## Technology Partners



## Corporate Partners







Q2 2022

## From crop to cloud

We build agricultural intelligence tools to help farming communities boost crop yields & optimise production

PREPARED BY



**Nils Helset**  
CO-FOUNDER & CEO

Detecting the world's most accurate field boundaries.

## Get in touch with us

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## Partners who trust us

