DigiFarm

ORNL Presentation

OAK RIDGE National Laboratory

TITLE OF TALK

How We Deeply-Resolve Sentinel-2 from 10m to 1m Per Pixel and Develop a Deep Neural Network for Automatically Detecting Agricultural Field Boundaries

PRESENTED BY

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CEO & Co-founder
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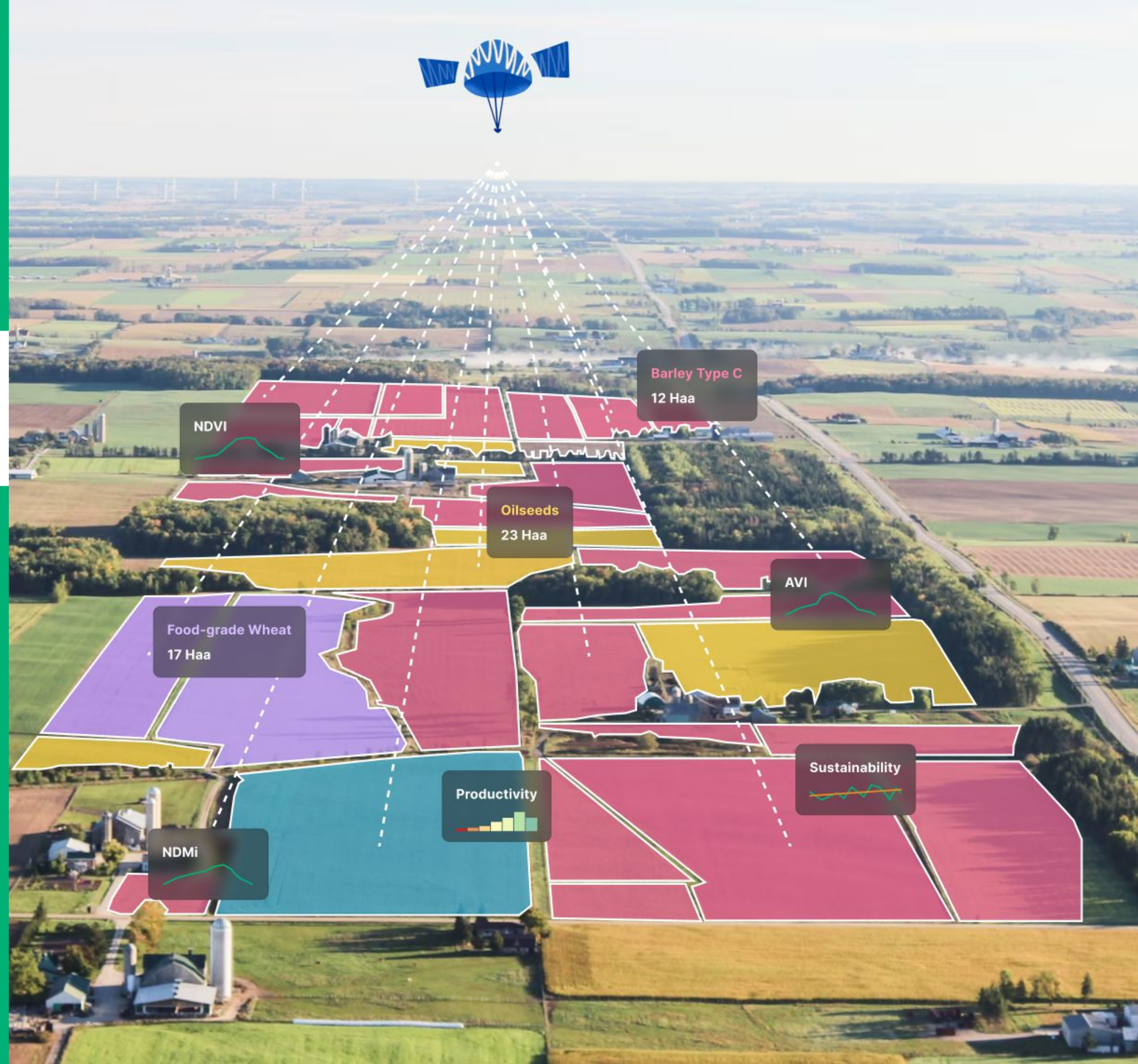
+47 948 42 517

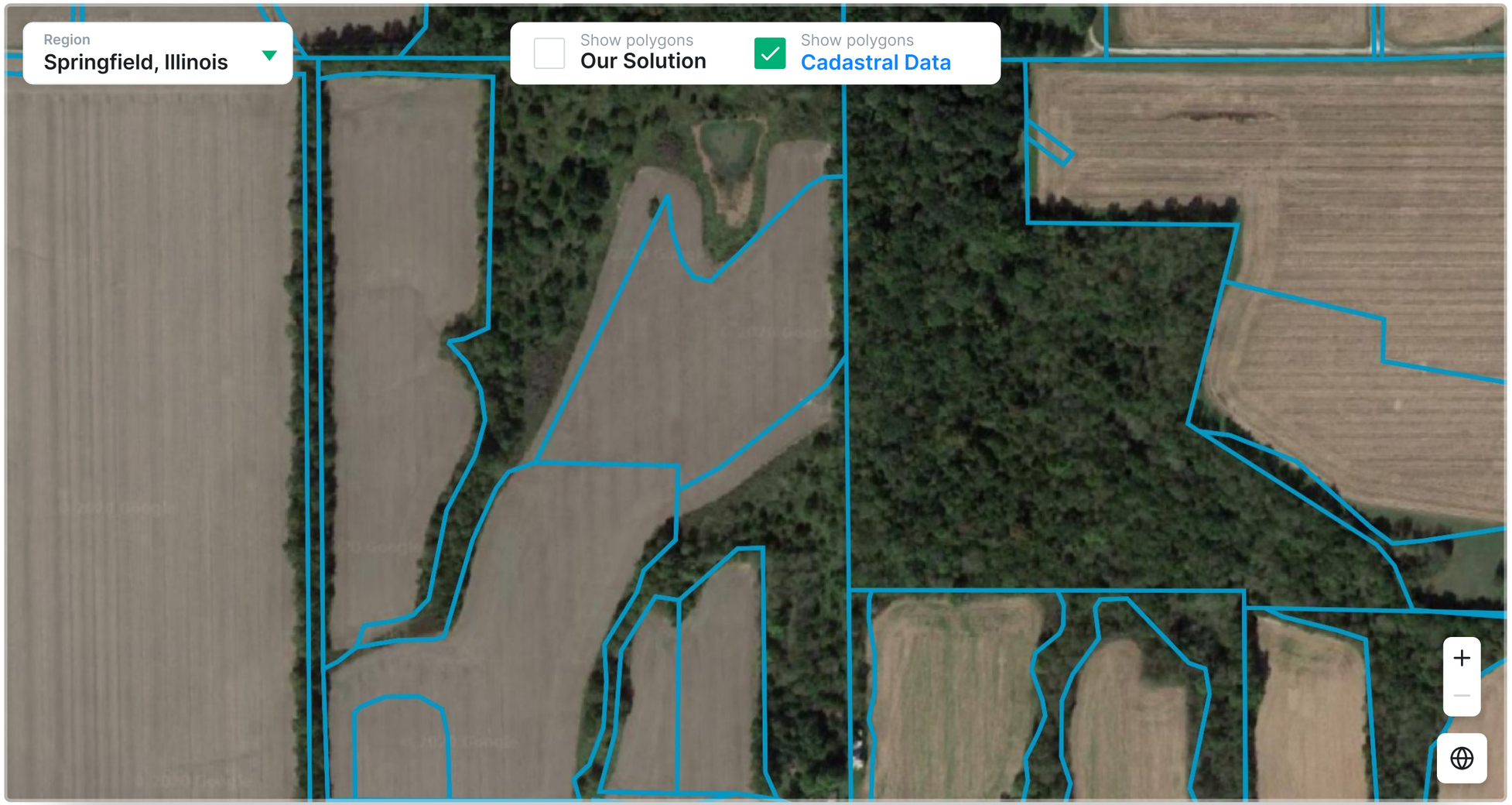


Background

All precision agriculture services starts with accurate field boundaries and seeded acres.

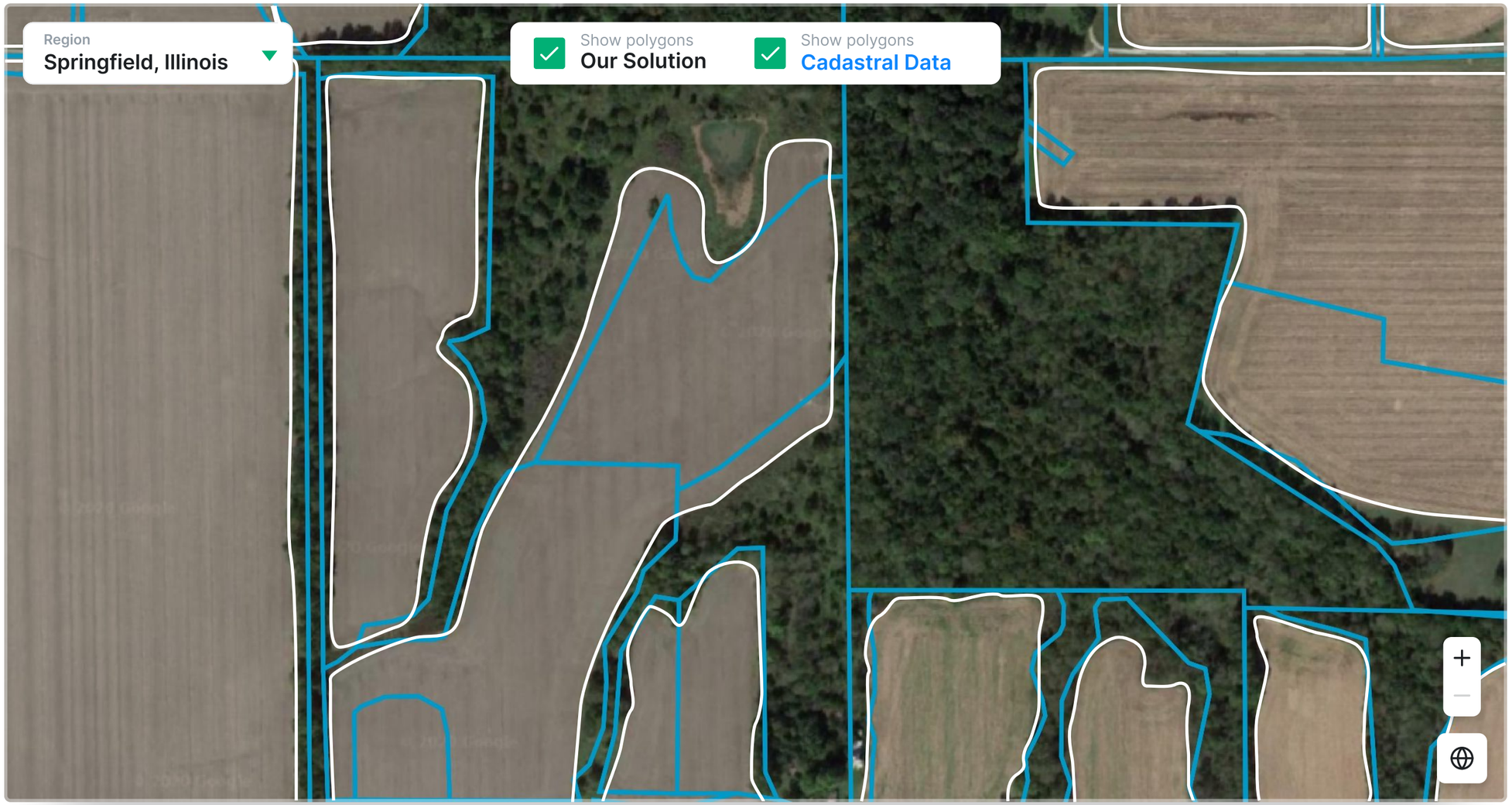
Nils Helset,
Co-founder & CEO
15th Generation Farmer

Current Problem



Our Solution

*click to open



Automatic Deep-Resolution of Sentinel-2 to 1m

*click to open

Deep Resolution Imagery | What is it?

1. Synthetically super-resolved & augmented SatEO imaging at effective 1 m/px spatial resolution derived from Sentinel-2 L2A
2. Orthorectified and geo-referenced nadir imaging data with geo-positioning accuracy of from 1 to 5 meters
3. 10 spectral bands radiometrically and atmospherically corrected surface reflectance.
4. Regular global coverage from 56° S to 84° N, including 5 years of historical archive. Images of any size are readily available

How accurate is it?

1.

RSME accuracy **on DR V2.0**

- DR2-RMSE = 0.011

2.

MSE accuracy **on DR V2.0**

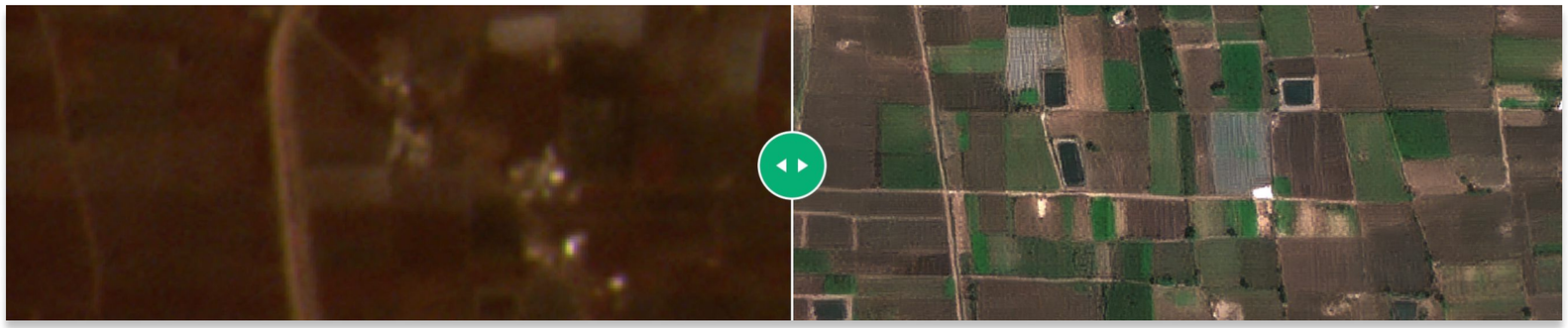
- MSE=0.00012 (PSNR=39dB)

DR2 is calculated over 10 bands of Sentinel-2 (10m+20m bands), in simple terms this is roughly equivalent to 99% accuracy.

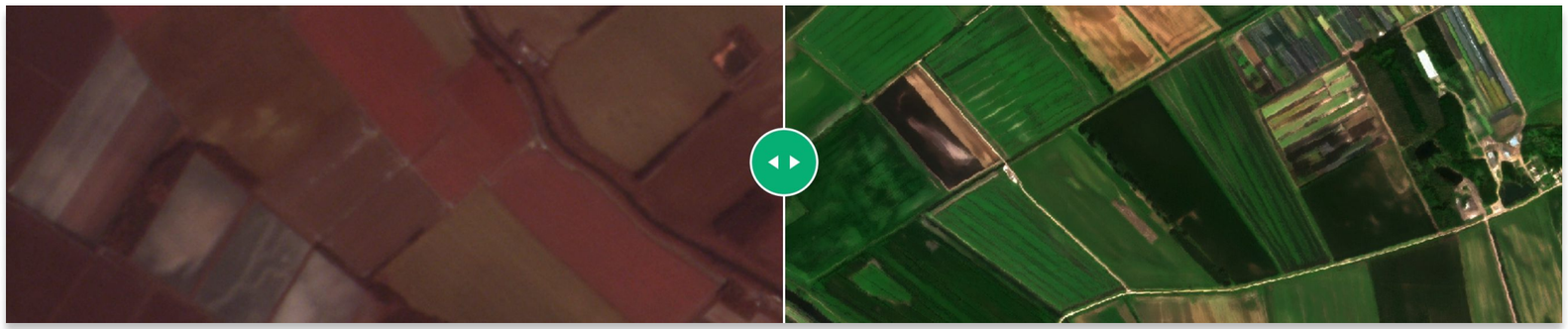
S2 Deep Resolution vs Commercial Grade SatEO

Brazil

India



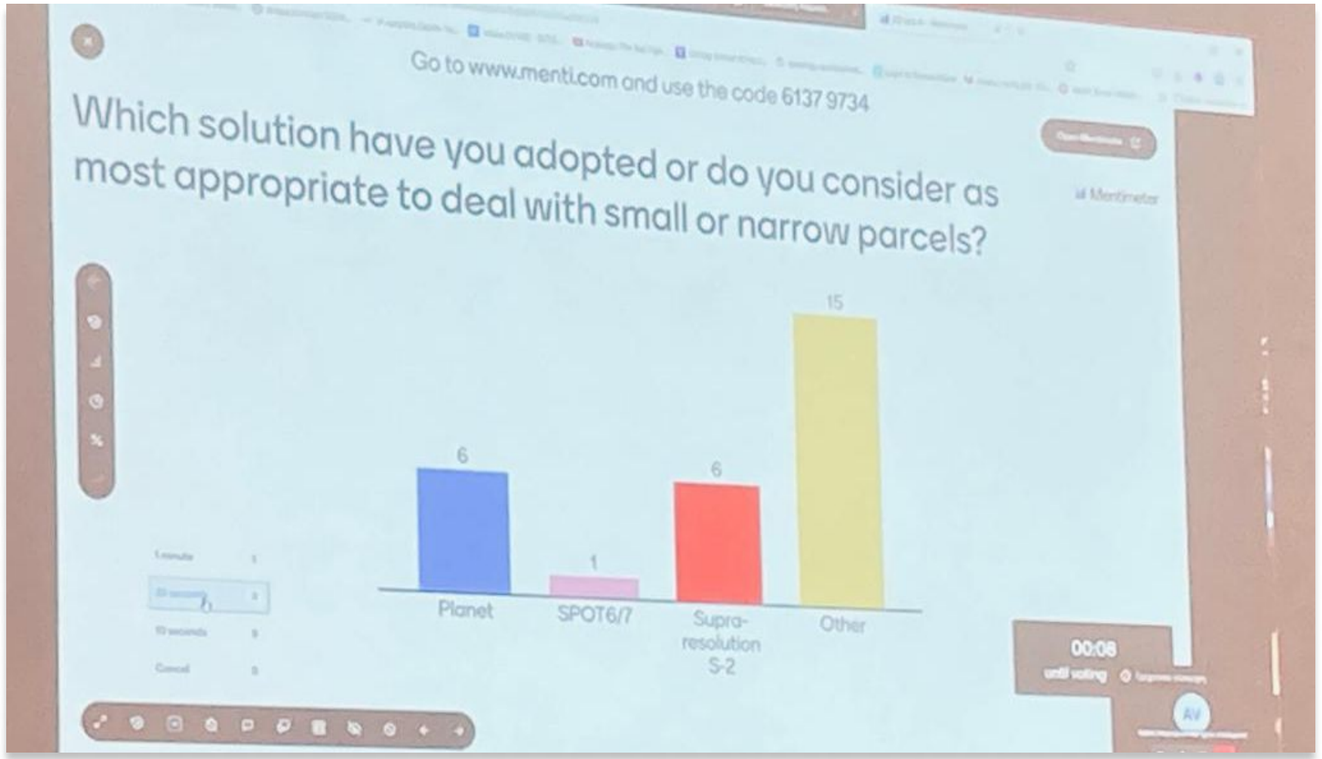
England



Demo Examples

ANALYSIS

Super resolution acceptance in the market



Existing Approach

1. If we were to buy commercial grade SatEO data it would cost us €1m/year to buy input data for Germany alone.

2. It would cost approx. €6.3m/year to manually draw and digitise all the boundaries in the US for example (175m ha's) and would take 15 people, working full-time for 1 year to do it.

Our Solution

1. It costs us €10k in (GPU/CPU) processing for all of Germany and we can do it instantly in 24 hours.

2. Currently, we can automatically delineated field boundaries at 12-15% higher accuracy across all of the US in 4 days with processing costs of €20k

Paying Agencies | Use-case

1. 3-year Ortophoto image cycle, during GSAA submission process farmers use up to 3 years old background map and LPIS is constantly not updated

2. This causes 20% in subsidy application errors out of 10% on-spot controls conducted

3. On-spot controls of 10% of all applications, i.e. 10,000 boundaries per year takes agency officers 3.5 months of manual visual inspection

“DigiFarm minimized the number of parcels drawn manually, thus reducing the number of errors and allowing faster and more accurate subsidy payments”.

NMA
NACIONALINĖ MOKĖJIMO AGENTŪRA

Paying Agencies | Use-case

Taking the Paying Agencies of Lithuania as an example with a budget of €650m/year

Total spend is ~€1.5m per year on yearly monitoring.

~€4.5m per year every year is penalties to data providers due to incorrect data

DigiFarm provides 25% reduction in yearly monitoring costs and reduces penalties, i.e. €1.5m per year

Wider EU-application

Field boundaries are created manually

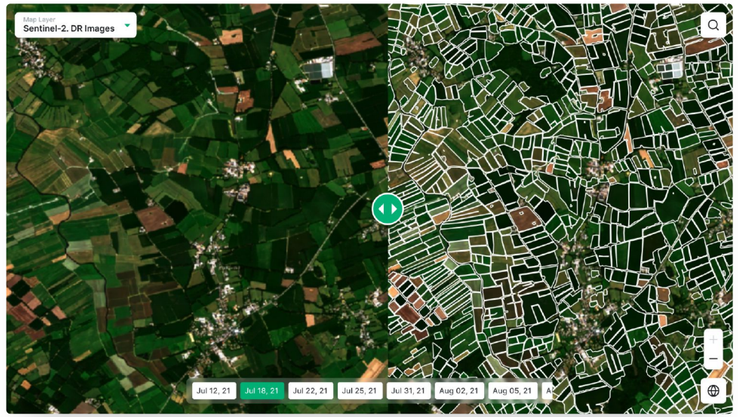
Only 5% of all subsidies are verified by National Paying Agencies in 27-EU regions

$708 billion in annual global farming subsidies rely on boundaries*

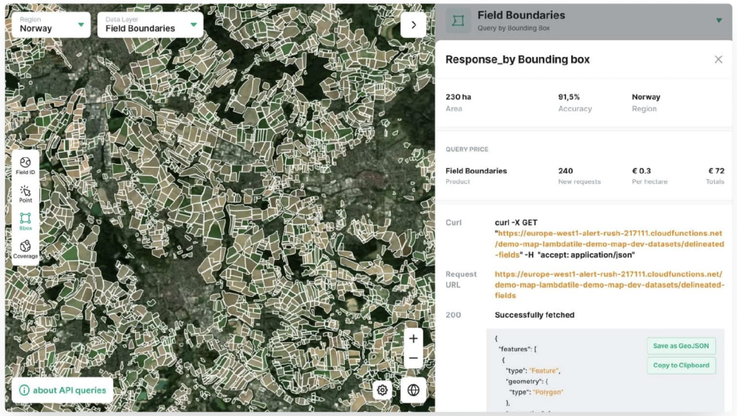
Costing $2.24 billion in annual monitoring cost in 27 EU-regions

*By 2030, this is projected to soar up more than three times to $1.759 trillion. Yet 87 percent of this support, approximately $470 billion, is price distorting and environmentally and socially harmful according to the UN.

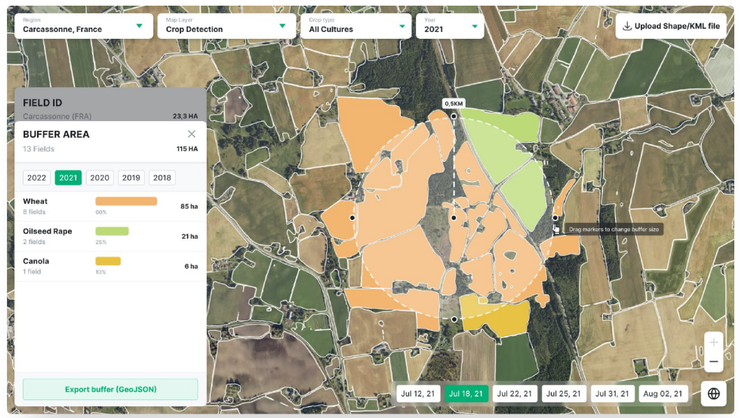
Providing full stack data-layers



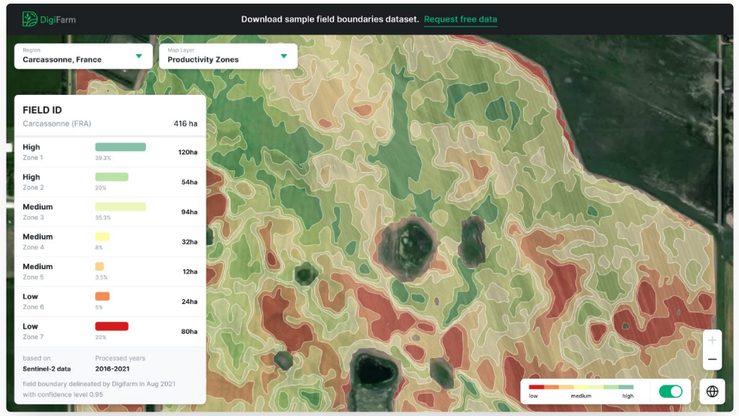
Deep Resolution S2 Imagery



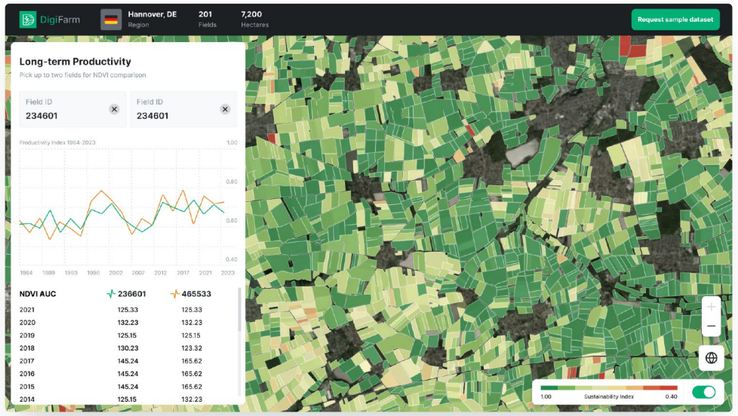
Field Boundaries



Crop Detection



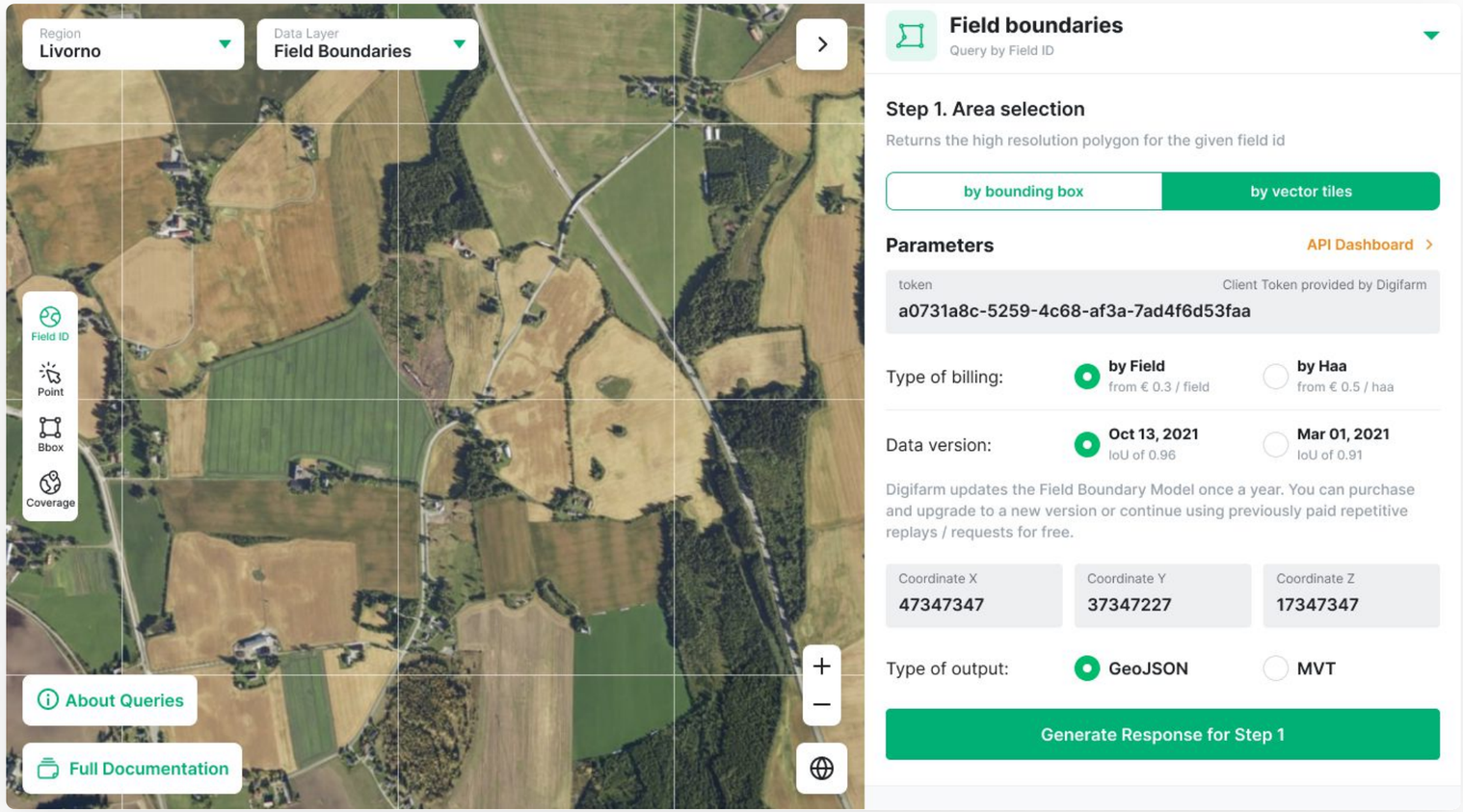
Multi-year Zoning

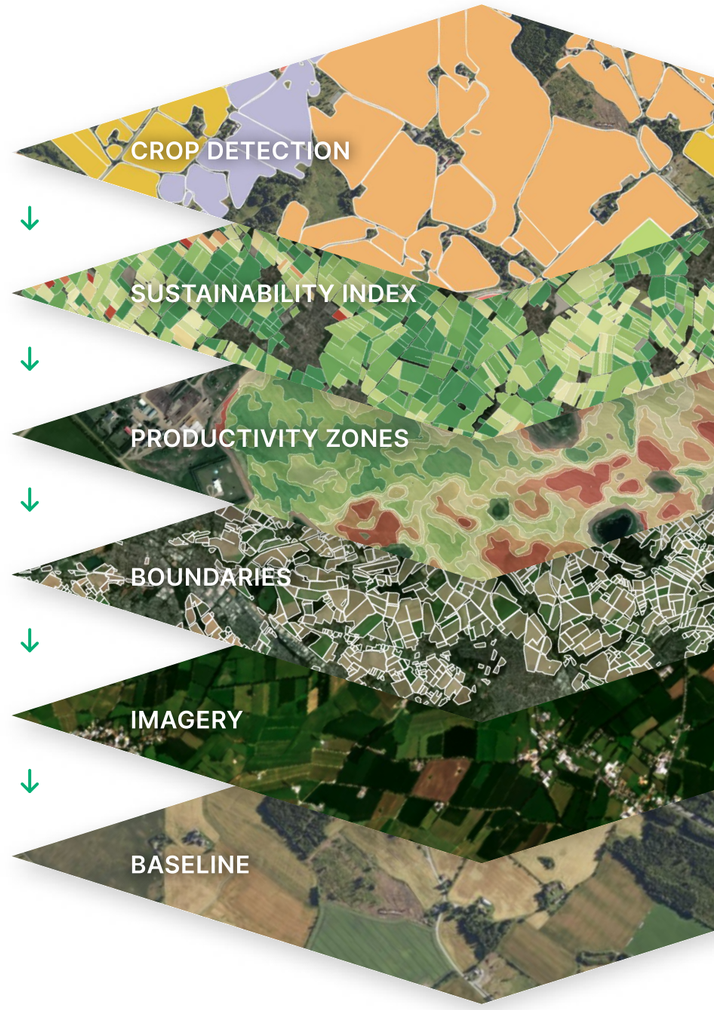


Sustainability Index

S2 Time-Series

Simple & Powerful API Delivery





Working across ag-value chain | Current clients

Machinery

CNH INDUSTRIAL

Mahindra Rise.

Seeds, Fertiliser & Crop Protection

KWS

FMC

MONSANTO

BAYER

Limagrain from earth to life

awba

FMS/FMIS

MAP MY CROP

HARDCASTLE GIS | IT | MOBILE

KARL

FarmersEdge

FARMRISE Powered by Bayer

fieldmargin

AGRICOLUS

sos agro

IoT, Monitoring & UAV

Agdir

Norsk Landbruksrådgiving

E-STRATOS

AUSTER TECNOLOGIA

Subsidies & Govts

NMA NACIONALINĖ MOKĖJIMO AGENTŪRA

AMA AgrarMarkt Austria

AFSARD

USDA

Agricultural Lending & Rating

brain.ag A part of serasa experian.

serasa experian

MRV & Sustainability

Klim.

WWF

agmatix

permarobotics automation for regenerative agriculture

Agtelligence

varda FIELD DATA EXCHANGE

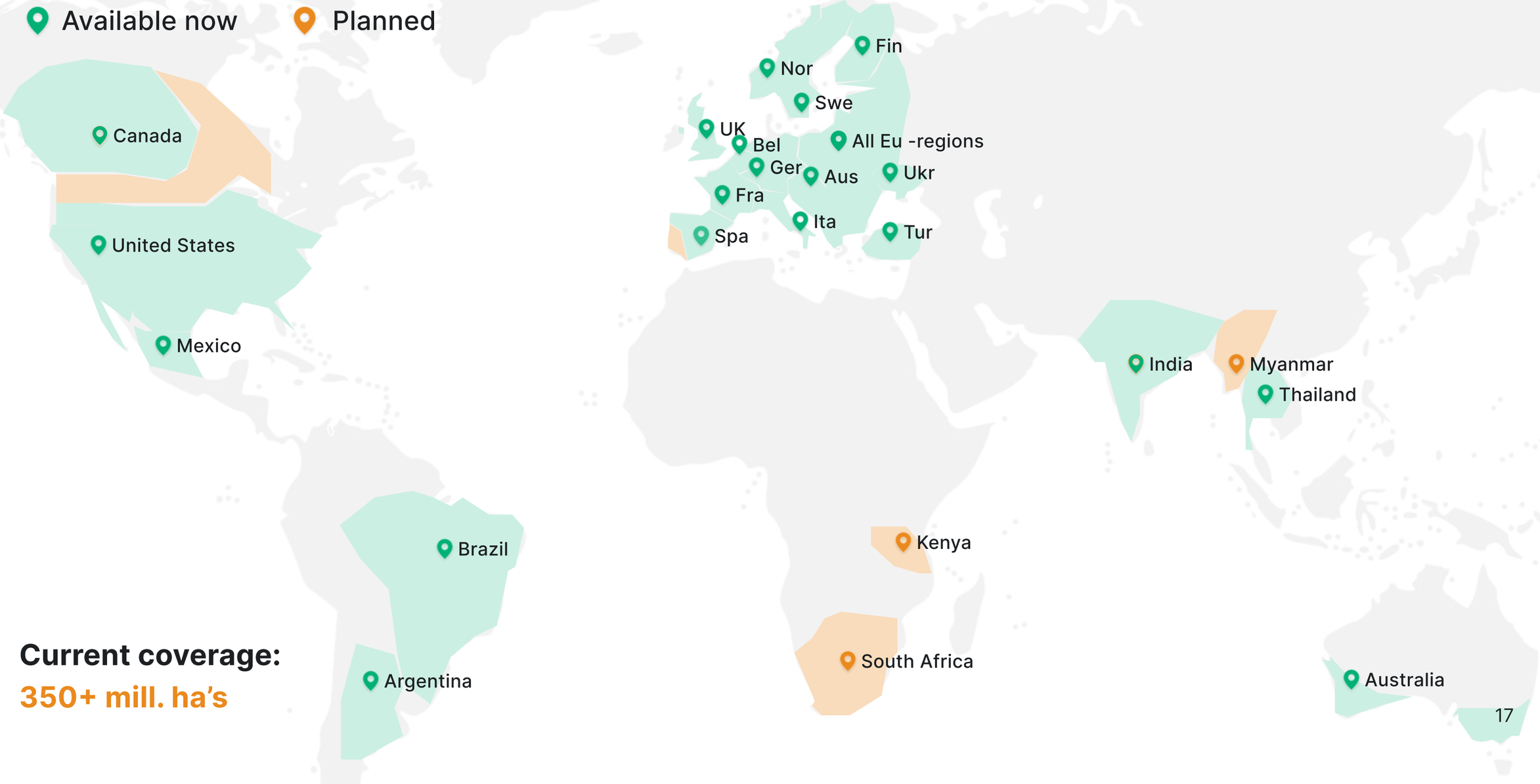
THE FRESHWATER TRUST

Marketplace

PACRIDGE

TRUECROPS

Global & Scalable Solution | Defying the odds in Ag



Current coverage:

350+ mill. ha's

Competition: Product comparison | SatEO imagery

COMPARISON	DigiFarm	planet.	AIRBUS	SATELLOGIC	MAXAR
Name	Deep-Resolution Sentinel-2	PlanetScope	Spot 6/7	Aleph-1	Worldview-2
Price per sq.km	€0.2	€1.2	€4.5	€6.0	€17
Resolution	1 m	3 m	1.5 m	0.99 m	0.5 m
Spectral bands	10	4	4	4	8
Cycle/frequency	5 days	Daily	26 days	Daily	Daily
Coverage	Global	Global	Global	Global	Global

Large clients who trust us

Clients

CNH INDUSTRIAL
soil.diagnostix
KWS
FarmScore — Space enabled sustainable farming — Powered by Agtelligence Ltd
CLIMATE FARMRISE
Klim.
FarmersEdge
AGRICOLUS
THE FRESHWATER TRUST
PACRIDGE
AMA AgrarMarkt Austria
Limagrain — de la terre à la vie
TRUECROPS
MAP MY CROP
WWF
HARDCASTLE — GIS | IT | MOBILE
sos agro
Agdir
fieldmargin
HELM
serasa experian
AG ANALYST
agmatix
Norsk Landbruksrådgiving
awba
AUSTER TECNOLOGIA
Mahindra Rise.
AGTELLIGENCE — Farmer-Friendly Agritech
QUEST INNOV
brain.ag — A part of serasa experian
KARL
NMA — NACIONALINĖ MOKĖJIMO AGENTŪRA
E-STRATOS
permarobotics — automation for regenerative agriculture
MONSANTO
FMC
BAYER
varda — FIELD DATA EXCHANGE

Resellers & Distributor Partners

سیراب SEERAB
Descartes Labs
THAICOM
UP 42
alynix
LATITUDO 40
TERRAMETRIC — Experienced. Proven. Successful.
lofty.

History

Soft funding secured to date	Off. launch Jan. 2022	Field Boundaries delivered	Users/ farmers
€7m	**35 clients**	**3.75M**	**350k+**
2019-2023	Commercialization	Delivered in 2022	Delivered to in 2022

2019 Founded

Norwegian University of Life Sciences
Norsk Landbruksrådgiving
Innovation Norway
The Research Council of Norway

2020

KJELLER INNOVASJON
hamar regionen
STARTUP LAB
skattefunn
NCE HEIDNER Biocluster Norwegian Centres of Expertise

2021

NVIDIA INCEPTION PROGRAM
Oracle Startup Cloud Accelerator
Google Cloud for Startups
Copernicus accelerator
aws activate

2022

ORACLE
AIRBUS
INNOspace MASTERS
CREATIVE DESTRUCTION LAB
eit Food
Funded by the European Union
ROOTCAMP A SPINLAB INCUBATOR

2023+

European Commission
European Innovation Council
Norsk Romsenter Norwegian Space Agency
AI4 copernicus
esa

Company Organization

Core Team

Nils Helset,
Co-founder & CEO

Konstantin Varik,
Co-founder & CTO

Matias Forbord,
Head of Engineering

Anton Shatsila,
Head of Product

Girish Pallagatti,
Full Stack Engineer

Rohit Shetty,
Backend Engineer

Alexei Melnitchouck,
Digital Farming & Precision Ag Evangelist

Yosef Akhtman
Head of AI & DR

Stefan Naskovski,
Head of Field Delineation

Ben Rizo,
Account Manager

Leonardo Ibarra,
Sales Engineer

+52

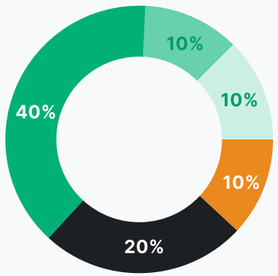
Skilled team members

May, 2019
3 Team Members

May, 2020
6 Team Members +3

May, 2021
15 Team Members +9

Jan, 2022
42 Team Members +27



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

External Advisory Board

Caspar Olenhusen,
AgriFoodTech Specialist

Jørgen Ole Haslestad,
Former CEO of Yara

Sverre Bisgaard,
Former Founder & CEO of Kongsberg Norspace

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

Linn Dybdahl,
Project Leader, NCE Heidner Bioeconomy Cluster

Dennis Diaconescu
B2B Start-up & Product Leader

DigiFarm

Q2 2023

ORNL Presentation

OAK RIDGE National Laboratory

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

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Norsk Landbruksrådgiving · Klim. · AGTELLIGENCE · AGRICOLUS · UP42 · WWF · AMA AgrarMarkt Austria

LATITUDO 40 · KWS · varda FIELD DATA EXCHANGE · THAICOM · HELM · alynix · MAP MY CROP

Limagrain · AUSTER TECNOLOGIA · BAYER · DALHOUSIE UNIVERSITY · Agdir · HARDCASTLE · Mahindra Rise.

FarmersEdge · FARMRISE · HORSCH · permarobotics automation for regenerative agriculture · QUEST INNOV · fieldmargin