HxGN AgrOn

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Director - Technical

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Challenges in the Agriculture

Increase yield from existing land

Mitigate labour costs and shortages

Maintain profitability as prices rise

Combat the effects of climate change

Comply with regulations

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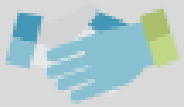
Challenges and Trends in Precision Agriculture

Data is growing but access and utilization is slow

Optimization and efficiency are still distant targets

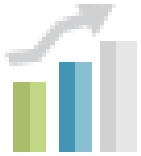


Engagements are 1:1

Expectations for Precision Agriculture

Save Money / Optimize Yield

- Improve soil quality
- Optimize yield through targeted hotspots
- New products and innovative technologies



Utilize Data with Key Analytics

- Use of satellite or drone data daily / weekly
- Precision and predictive decision making
- Variable rate application tied to prescriptions

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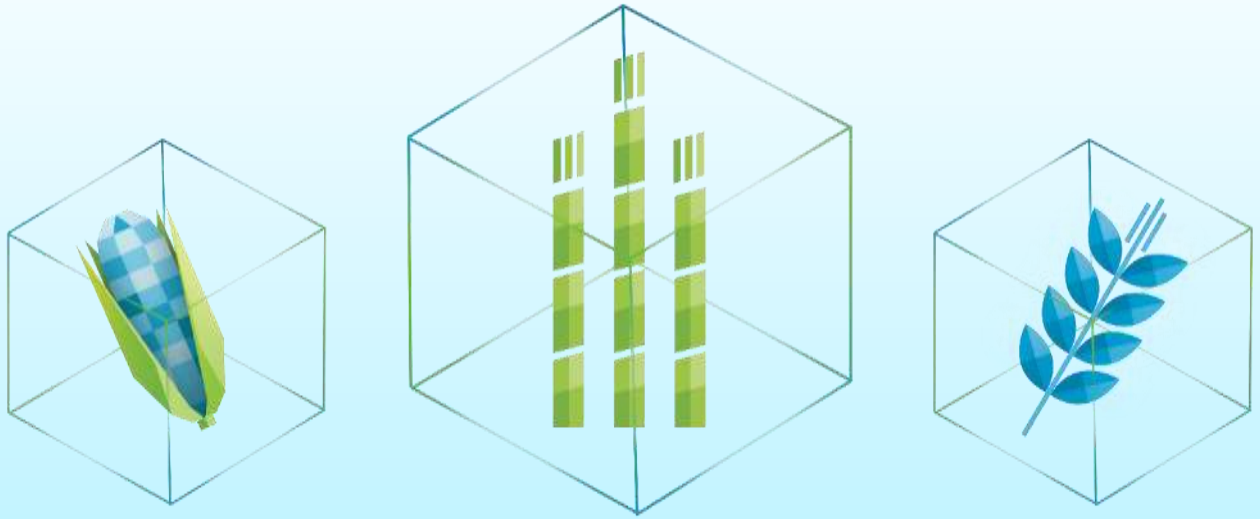
Digital Transformation will be the determining factor for successful and failed companies. It is no longer a matter of adopting or not adopting technology – it's a matter of choosing the right partner for this adoption.



Hexagon brings Smart Digital Reality to agriculture.

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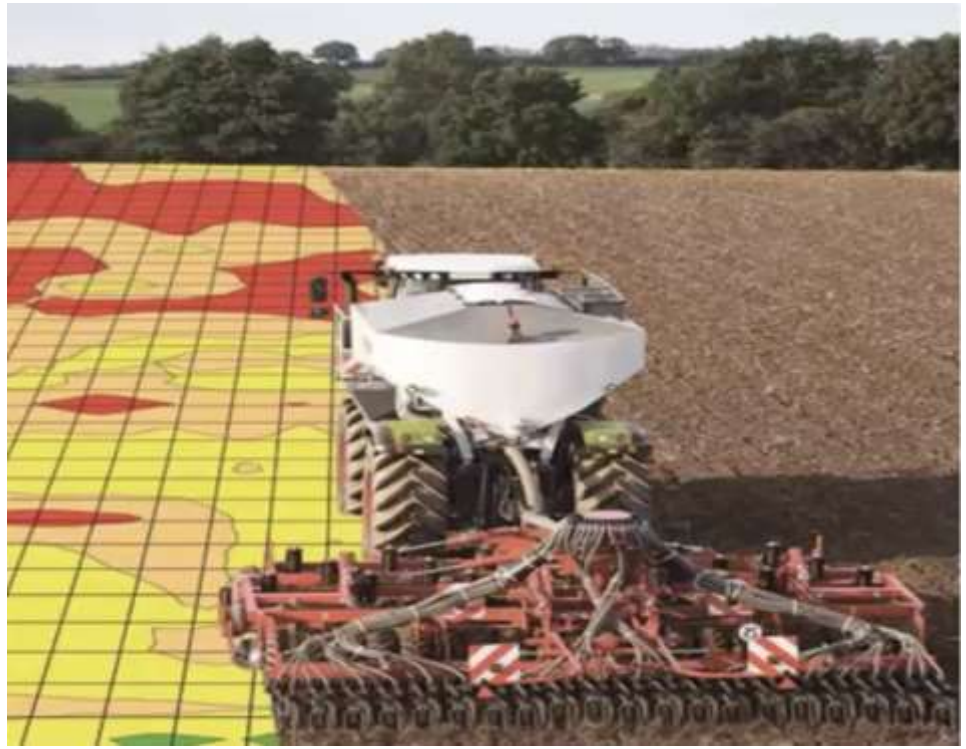
Precision Agriculture – Core Technologies

- Integrated electronic communications – Variable Rate Technology (VRT)
- High precision positioning systems (GNSS)
- Automated Steering Systems
- Geomapping
- Sensors and remote sensing
- Geospatial Image Processing
- Advanced Analytics



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HxGN AgrOn - Precision Agriculture

Intelligent management platform

Connected

Robust hardware and integrated modular software that streamlines operations, prevents waste, and increases profitability.

Sychronised

Onboard controllers intelligently interact throughout farming, harvesting, and transportation operations.

Optimised

Artificial intelligence tools create the strategy, with updated real-time data and predictive modelling.

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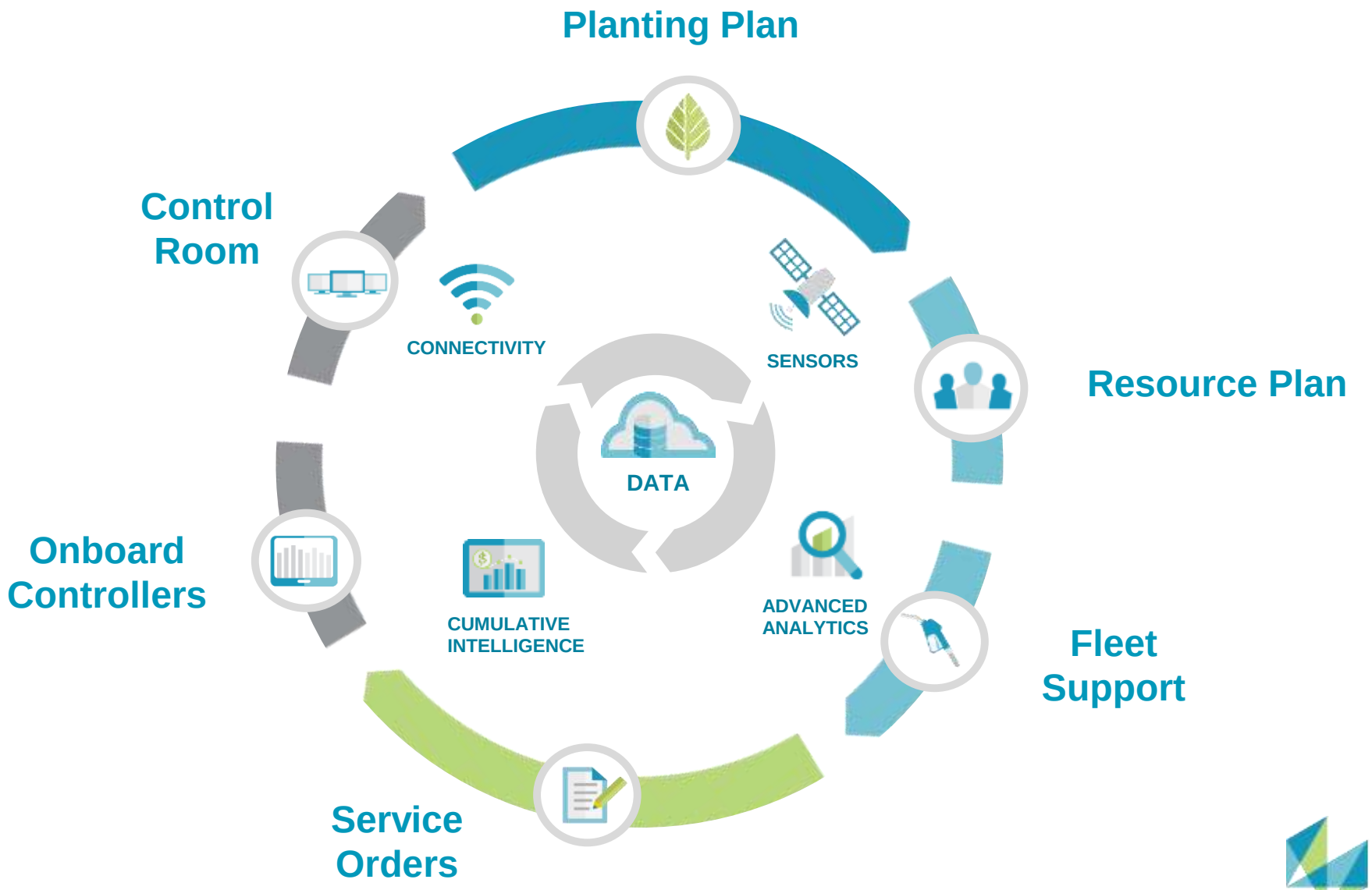
HxGN AgrOn Production



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From the planting strategy to organising the cultivation, **HxGN AgrOn | Planting Plan** executes a long-term plan that is aligned with your end goals.

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HxGN AgrOn | Resource Plan plans all operations and resources used in the preparation and planting – avoiding wasted resources and labour cost.

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HxGN AgrOn | Onboard Controllers are compatible with several market machines, intuitive, robust, and offers the unique service of remote technical assistance.

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Ti7 Onboard Controllers

- Auto Steering
- Guide
- Planting Control
- Planting Monitor
- Fertilization Control
- Spray Control
- Subsoiling Monitor
- Odometer

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Operation Mode

Adaptive Curve

CROP HEALTH ASSEMENT

- Based on aerial imagery (aircraft, drone, satellite)
- Uses a geo-processing engine to extract vegetation health information

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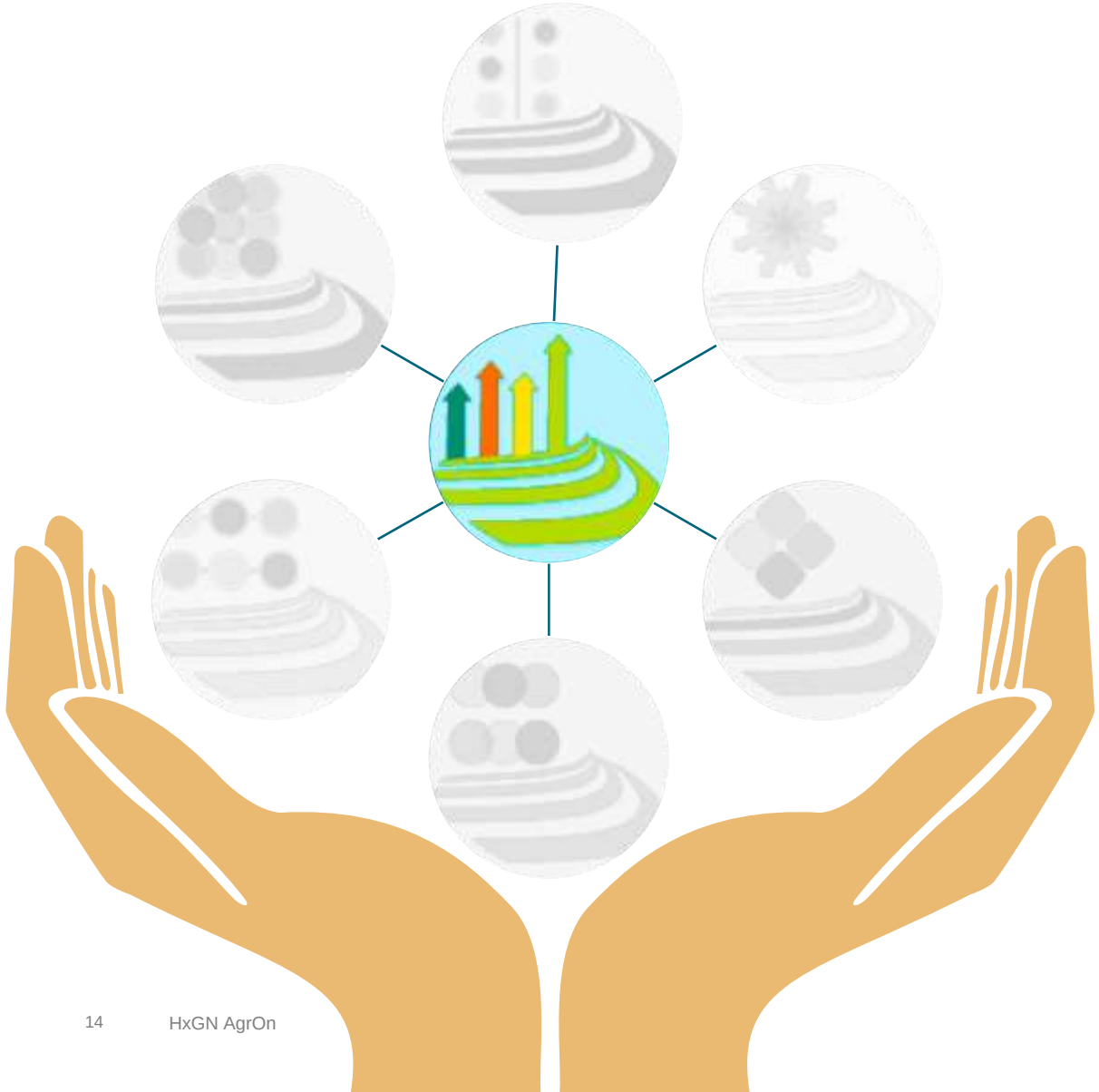
CROP HEALTH INDEX



Normalized Difference Vegetation Index

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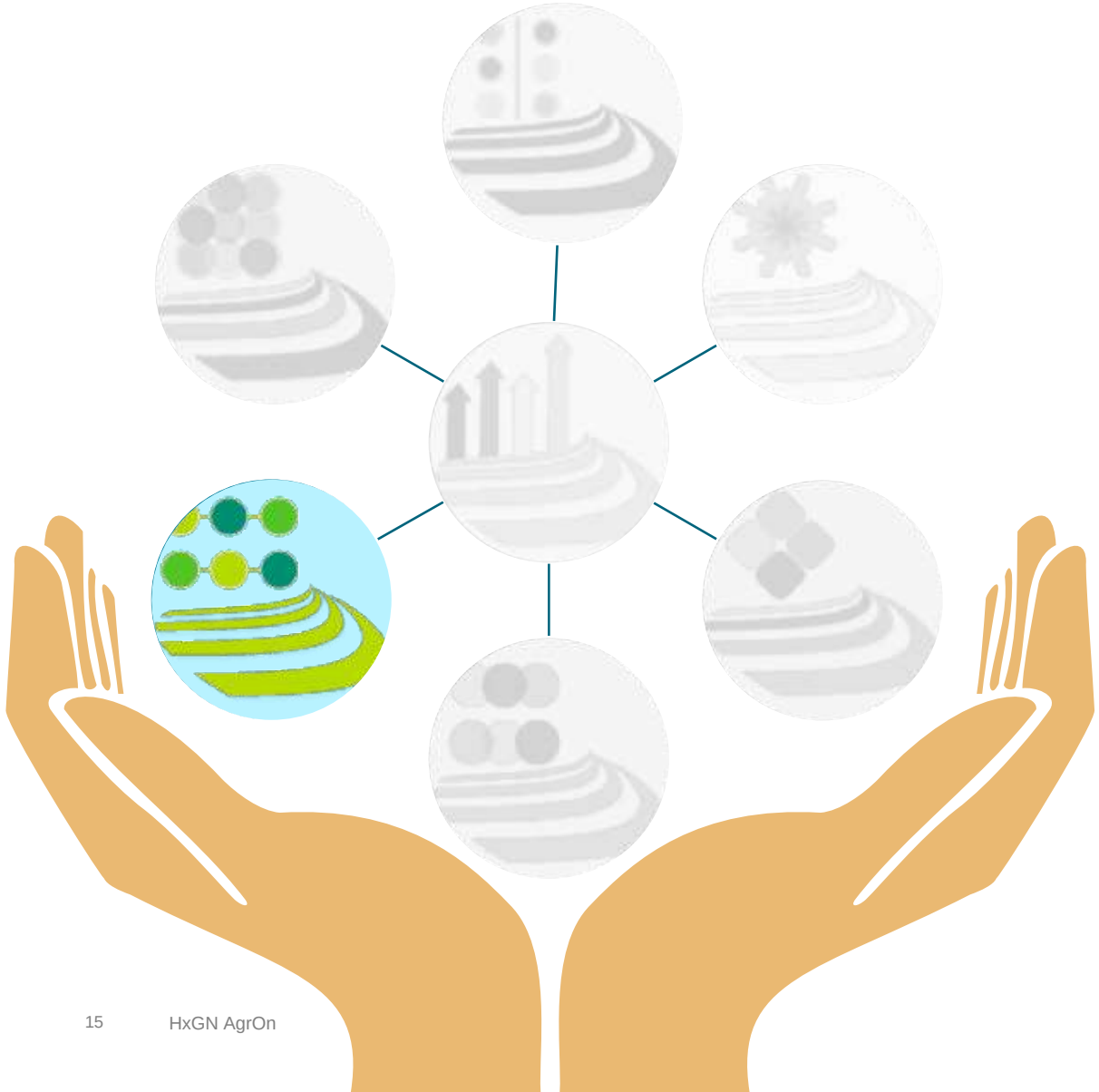
CROP HEALTH INDEX



Standard Crop Health Index

Soil Adjusted Vegetation Index (SAVI)
Adjusts for soil presence

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CROP HEALTH INDEX

Greenness Index

Greenness (SQRT)
Useful for uniform plant cover as it is sensitive to soil presence.

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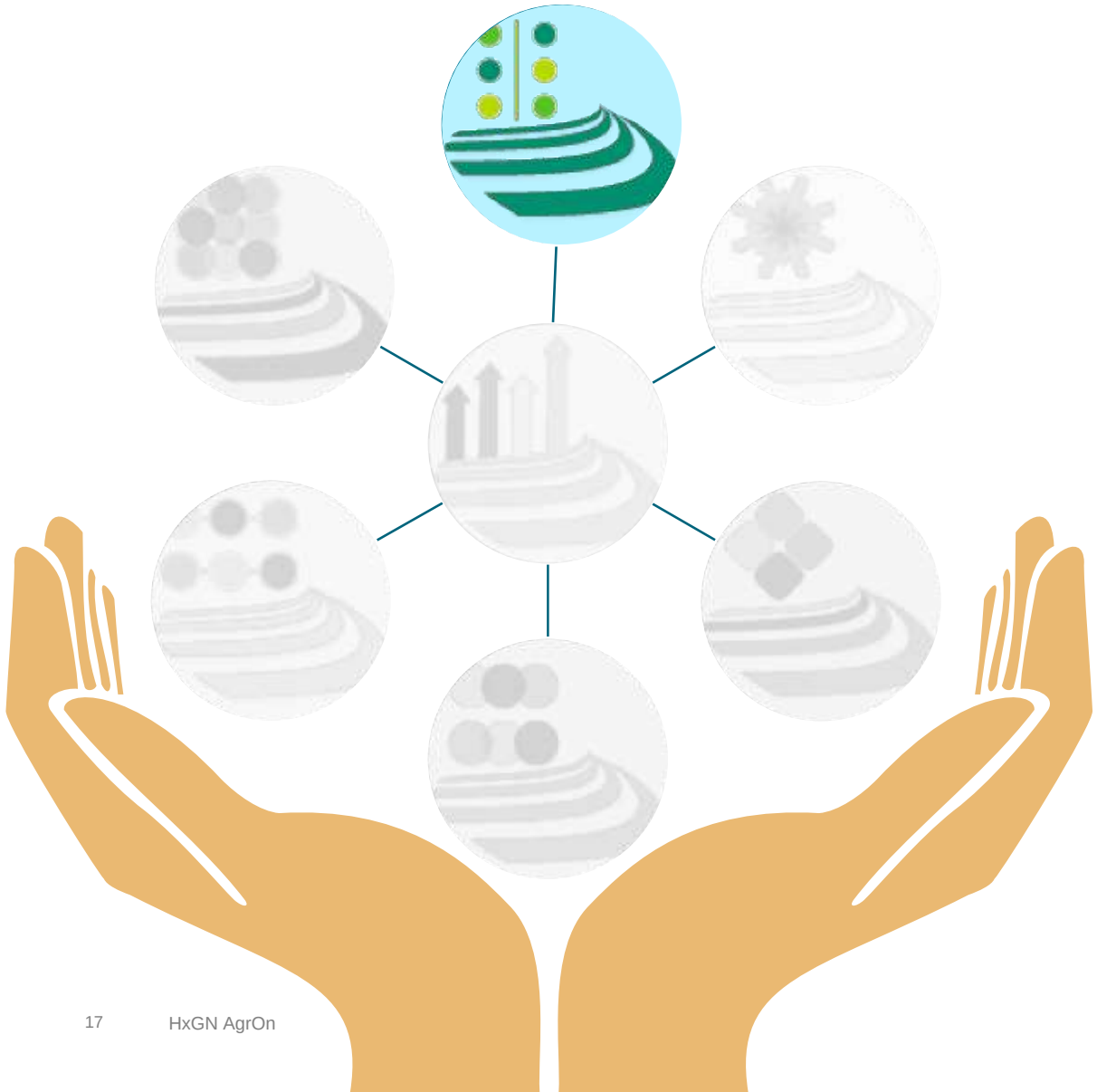
CROP HEALTH INDEX



Tall Crop
Health Index

Renormalized Difference Vegetation Index (RDVI)
Used for tall, slender crops

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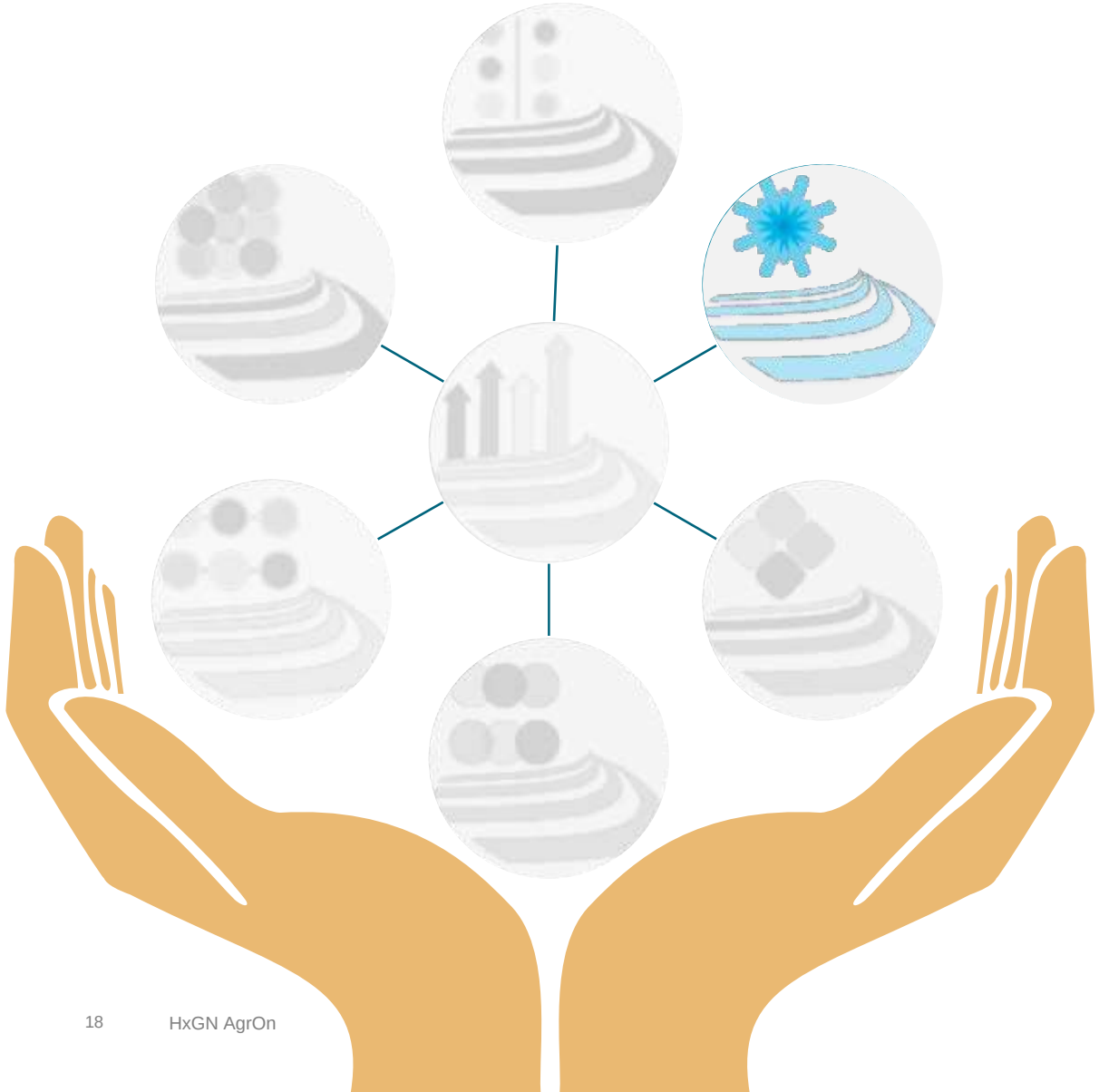
CROP HEALTH INDEX



Snow Index

Normalized Difference Snow Index (NDSI)
Useful for identifying snow covered areas, while ensuring that cloud cover does not interfere.

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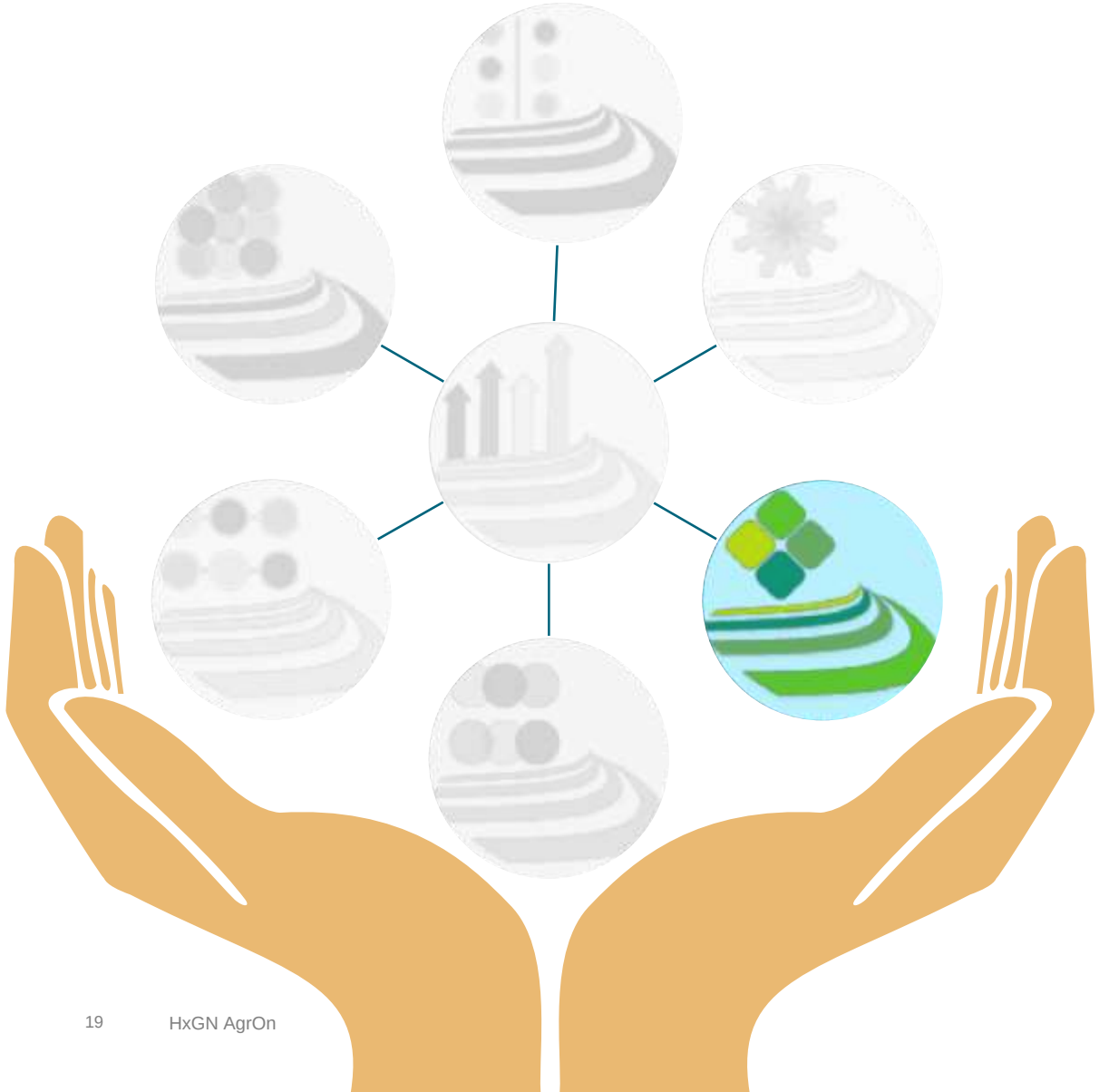
CROP HEALTH INDEX



Chlorophyll Index

Green Normalized Difference Vegetation Index (GNDVI)
Useful for early indicator of drought and soil stresses,

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CROP HEALTH INDEX

Advanced Crop Health Index

Modified Soil Adjusted Vegetation Index (MSAVI2)

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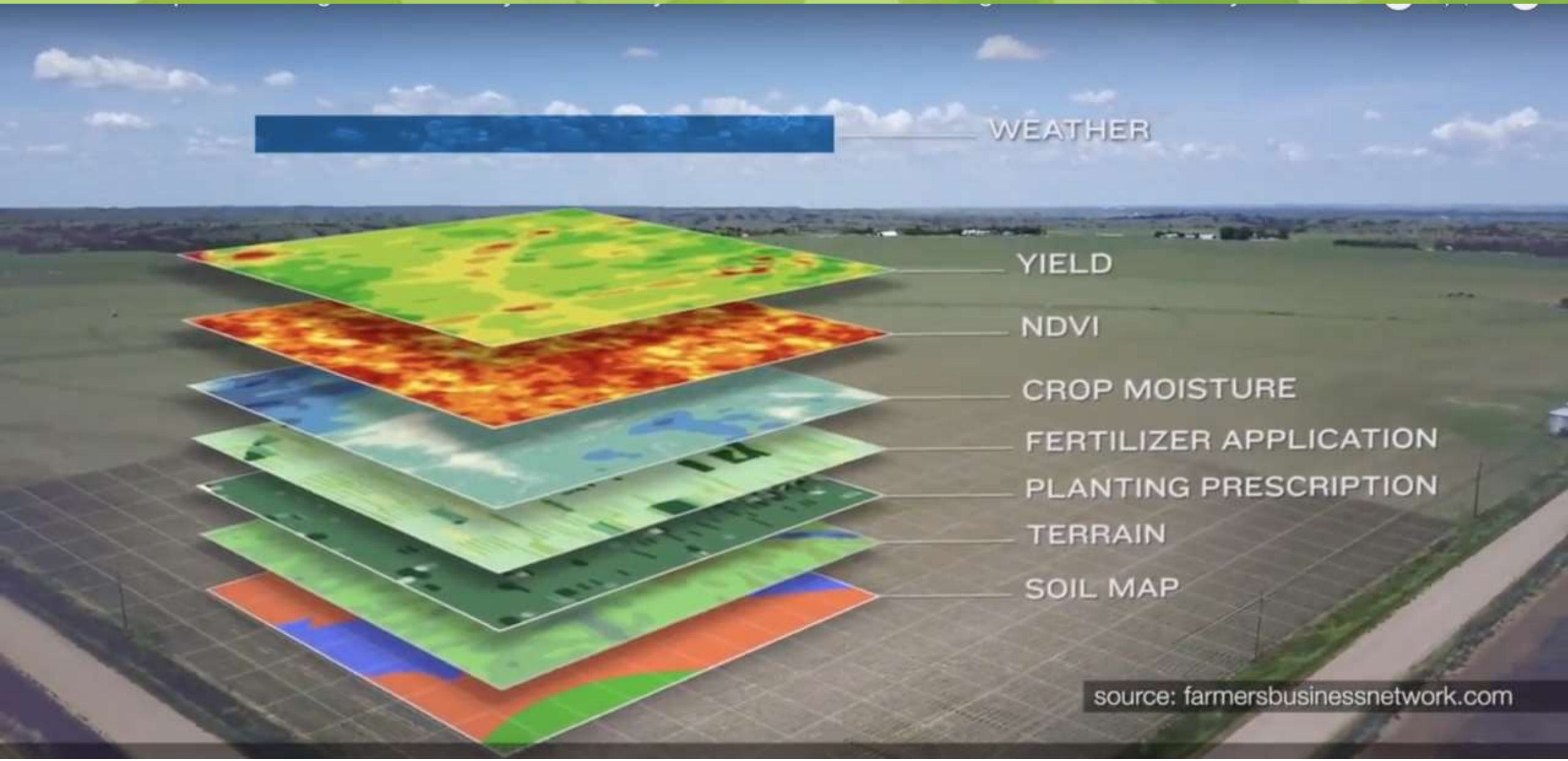

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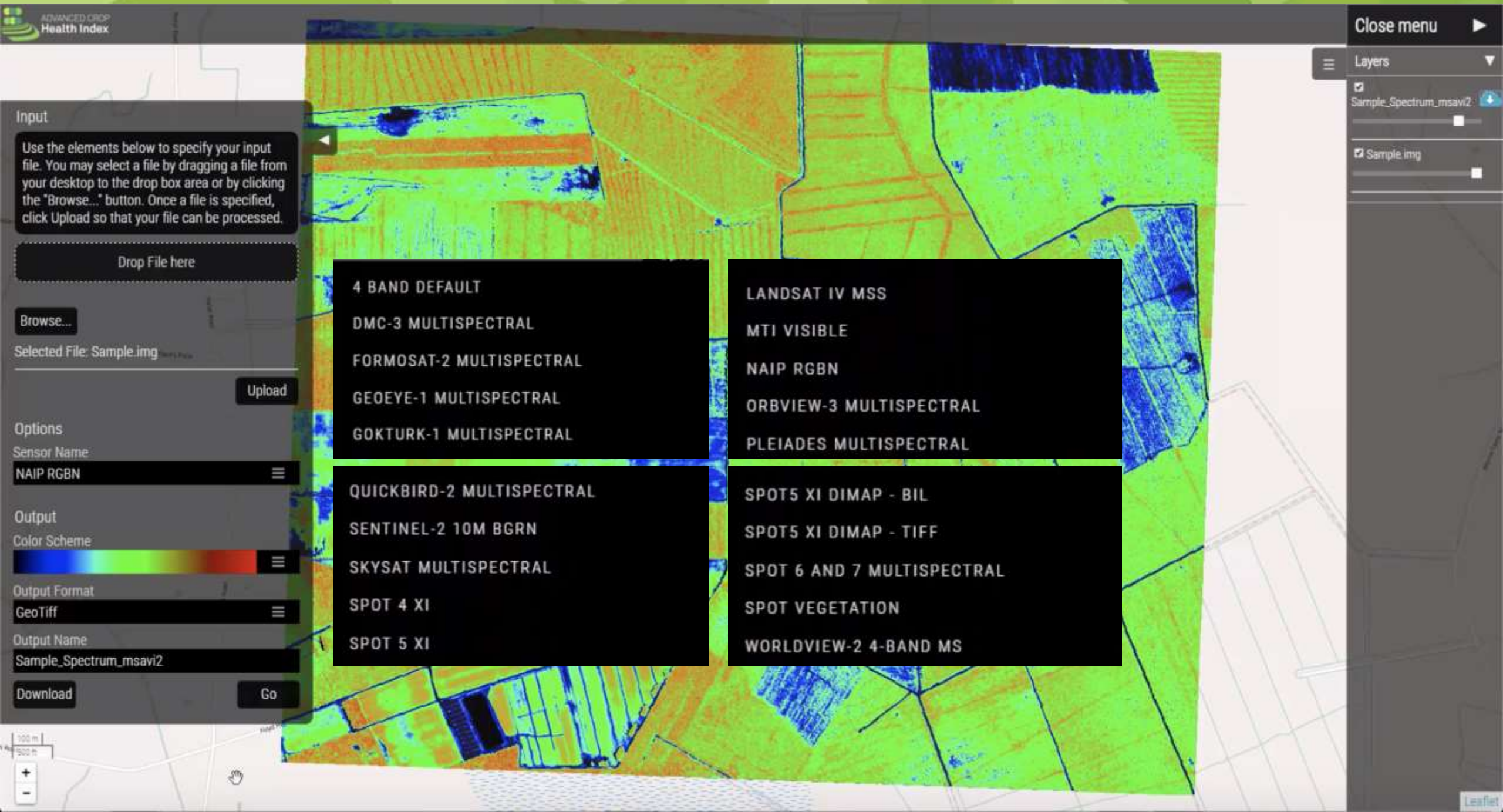
ADVANCED CROP
Health Index
Close menu
Layers
Sample_Spectrum_msavi2
Sample.img
Input
Use the elements below to specify your input file. You may select a file by dragging a file from your desktop to the drop box area or by clicking the "Browse..." button. Once a file is specified, click Upload so that your file can be processed.
Drop File here
Browse...
Selected File: Sample.img
Upload
Options
Sensor Name
NAIP RGBN
Output
Color Scheme
Output Format
GeoTiff
Output Name
Sample_Spectrum_msavi2
Download
Go
4 BAND DEFAULT
DMC-3 MULTISPECTRAL
FORMOSAT-2 MULTISPECTRAL
GEOEYE-1 MULTISPECTRAL
GOKTURK-1 MULTISPECTRAL
LANDSAT IV MSS
MTI VISIBLE
NAIP RGBN
ORBVIEW-3 MULTISPECTRAL
PLEIADES MULTISPECTRAL
QUICKBIRD-2 MULTISPECTRAL
SENTINEL-2 10M BGRN
SKYSAT MULTISPECTRAL
SPOT 4 XI
SPOT 5 XI
SPOT5 XI DIMAP - BIL
SPOT5 XI DIMAP - TIFF
SPOT 6 AND 7 MULTISPECTRAL
SPOT VEGETATION
WORLDVIEW-2 4-BAND MS
Leaflet

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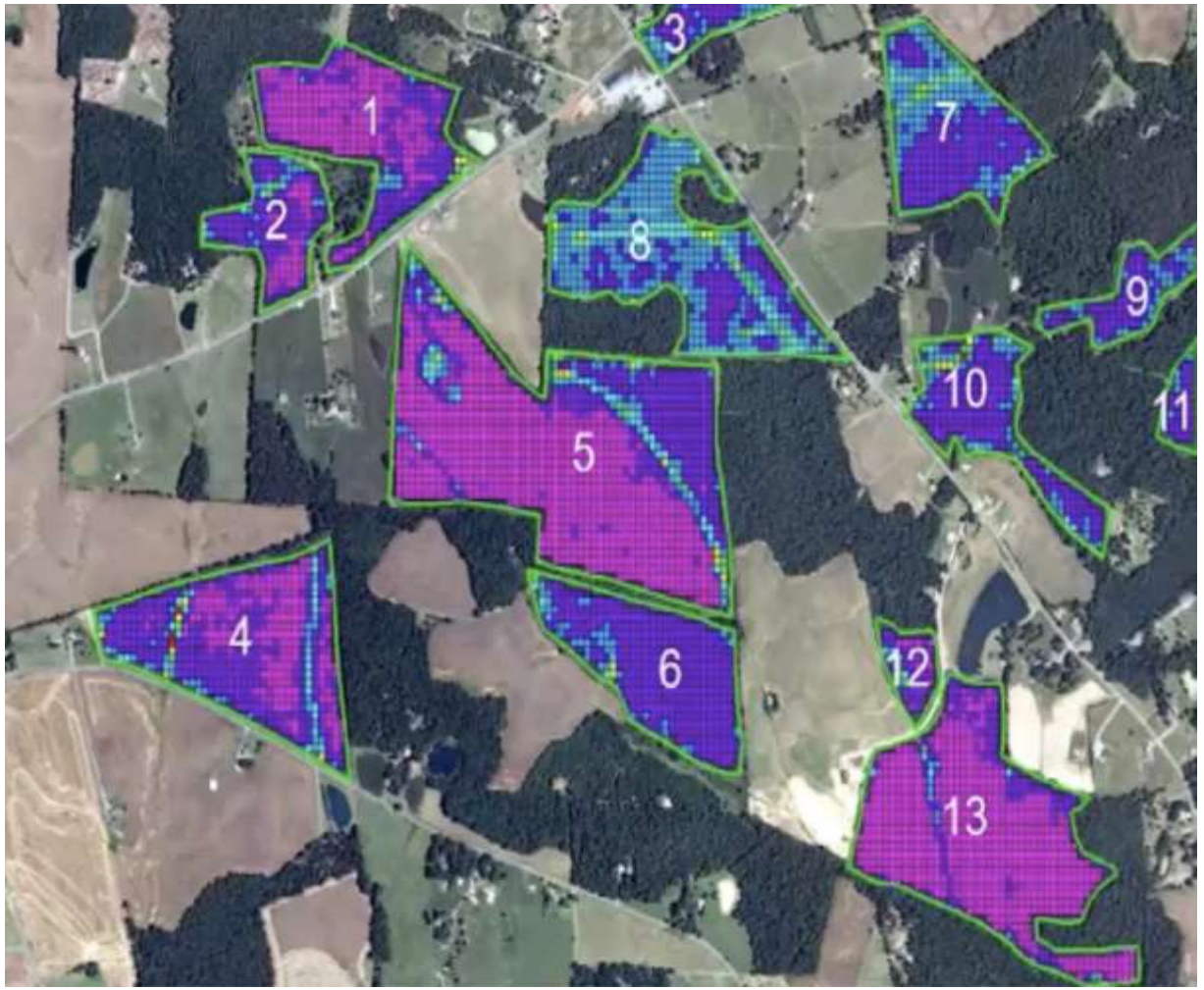
Variable Rate Technology application

Max 200 lbs. / acre @ $0.80 / lb.

Field	Acres	Lbs	Cost	#Grids	Lbs*	Cost*
1	232.1	4416	3534	385	2377	1901
2	9.9	1978	1583	172	1391	1112
3	31.6	843	675	74	8543	683
4	31.6	6311	5050	550	4365	3492
5	68.6	13703	10966	1194	5901	4721
6	21.2	4235	3389	369	3494	2796
7	18.7	3733	2988	325	3840	3072
8	30.0	5984	4789	522	7014	5611
9	5.8	1160	928	101	1072	85810
10	13.2	2634	2108	230	2618	2095
11	2.1	428	342	37	354	283
12	3.1	623	498	54	472	378
13	41.4	8286	6631	722	31234	2499
Total	271.9	54934	43481	3660	34903	29501



Grid size 80” x 80”

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Variable Rate Technology application

Max 200 lbs. / acre @ $0.80 / lb.

Grid	Acres	Lbs	Cost	Lbs*	Cost*
1	0.056	11.2	8.9	16.2	10.7
2	0.056	11.2	8.9	15.6	12.5
3	0.056	11.2	8.9	9.7	7.7
4	0.056	11.2	8.9	8.9	9.2
5	0.056	11.2	8.9	0.0	0.0
6	0.056	11.2	8.9	3.9	3.1
7	0.056	11.2	8.9	10.1	8.1
8	0.056	11.2	8.9	12.5	10.0
9	0.056	11.2	8.9	9.5	9.5
10	0.056	11.2	8.9	11.6	9.3
11	0.056	11.2	8.9	13.3	10.6
…	…	…	…	…	…
…	…	…	…	…	…
Total	31.6	6311	5050	4365	3492

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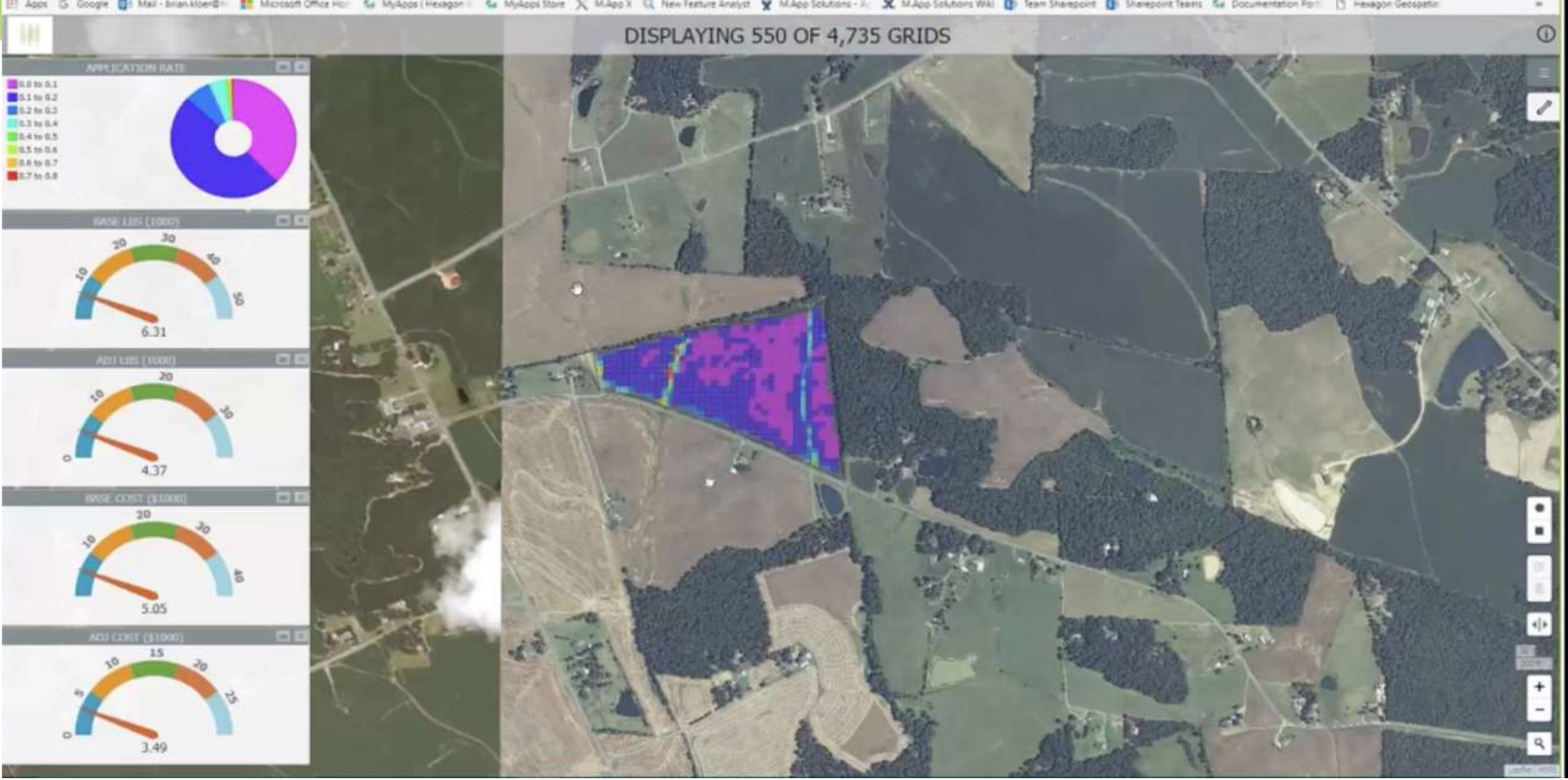

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CROP YIELD with Precision Agriculture

Crop	Cost in conventional	Cost in Precision	Yield in conventional in MT	Yield in precision in MT	% Yield increase over conventional	Net income in conventional	Net income in precision	Market price range
Tomato	61,000	99,800	50	150	200	39,000 @Rs. 2/kg	2,75,200 @Rs 2.5/kg	2-30/kg
Chilli	46,000	68,000	22	35	59.09	64,000 @ Rs 5/kg	1,42,000 @Rs 6/kg	5-15/kg
Capsicum	49,000	72,000	18	25	39	95,000 @Rs 8/kg	1,53,000 @Rs 9/kg	8-25/kg

Courtesy to: Institute of Agriculture Science, 2017

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LOCAL IMPLEMENTATIONS

AMNEX

formally known as Infinium Solutions

Agriculture Insurance Company of India Limited

skymet weatherwise

NCFC

HEXAGON GEOSPATIAL TECHNOLOGY is used for

1. CROP ACREAGE IN ALL SEASONS
2. CROP HEALTH CONDITION
3. SMART SAMPLING FOR CCE
4. FINAL CROP ACREAGE
5. PRODUCTION ESTIMATE

As per PMFBY guidelines, RS/UAV to be used for faster & accurate cropped area estimation

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RESULTS

- Save Money
- Optimize Disbursement
- Increase Potential Yield
- Decrease Potential Loss
- Reduce Risk (harmful runoff)
- Improve Efficiency

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Global Customers

Outstanding technology provider to global industry players

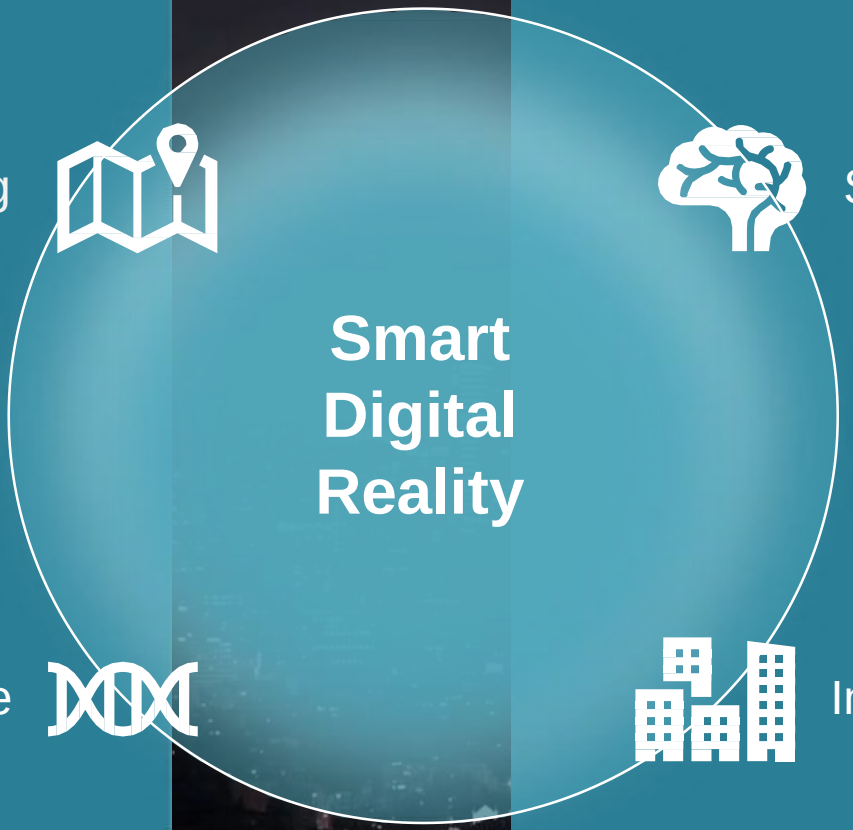
Our core capabilities

The Physical World

Intelligent positioning

SENSING TECHNOLOGIES
(data capture)

Reality capture



Situational intelligence

SOFTWARE
(data management)

Industrial design

The Digital World

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Hexagon

Technology solutions provider

- Established leader in **information technologies**
- Solutions drive **productivity** and **quality** improvements

Strong financials

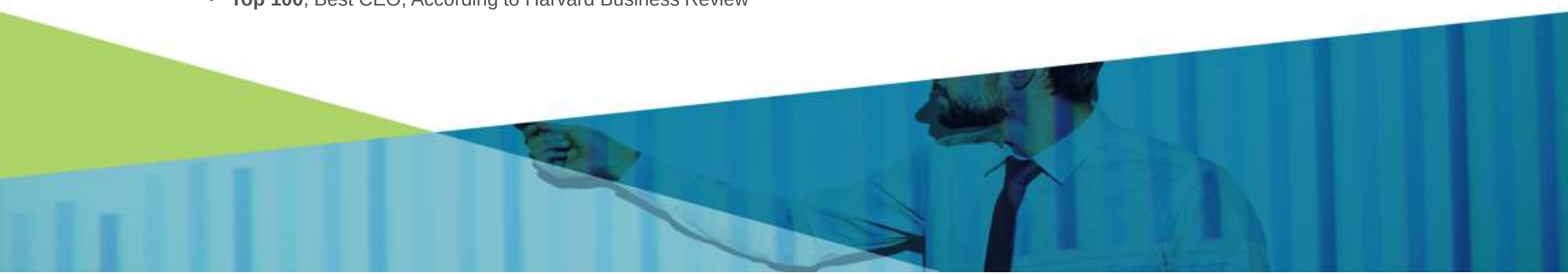
- **3.5 bn US** in sales
- **23.4% operating** margin
- **No. 36** in top-performing multinationals, according to Forbes
- **Top 100**, Best CEO, According to Harvard Business Review

R&D focused

- **10-12%** of net sales invested in R&D
- **3,400+** employees in R&D
- **3,200+** active patents

Global reach

- Broad range of vital industries served
- More than **18,000** employees in **50** countries



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Hexagon solutions explore data to the maximum, enabling intelligent planning, control, and monitoring of resources, production, labour, and climate change to connect field, equipment, and people.

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Agriculture shall be done in a way as if being an industrial manufacturing system, considering the processes of complex industrial production which have to be applied similarly to achieve the same fruitful success as the healthy manufacturing enterprises have

— Albrecht D. Thaer, 1801

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THANK YOU

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