



Digital Farming

*Solutions for  
Every Farm*

**Hamburg; 12 June 2018**

Roslyn Chua



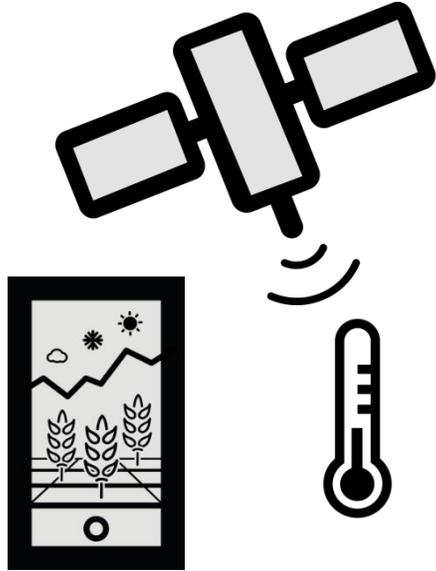


# Agenda

- // Key Trends driving adoption of digital technologies in farms globally
- // Case studies on different business models in the industry
- // Bayer Digital Farming – key principles



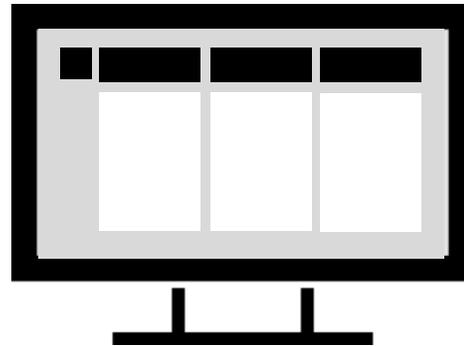
# How Digital Farming Solutions Work



**Mobile Products/Sensors**

**Data**

**Understand what happens locally!**



**Command Centre**

**Agronomic Decision Engine**

**Analyze and plan agronomy!  
Keep the overview!**



**Crop Protection + field specific timing + variable application maps**

**Decision Support**

**Do!**

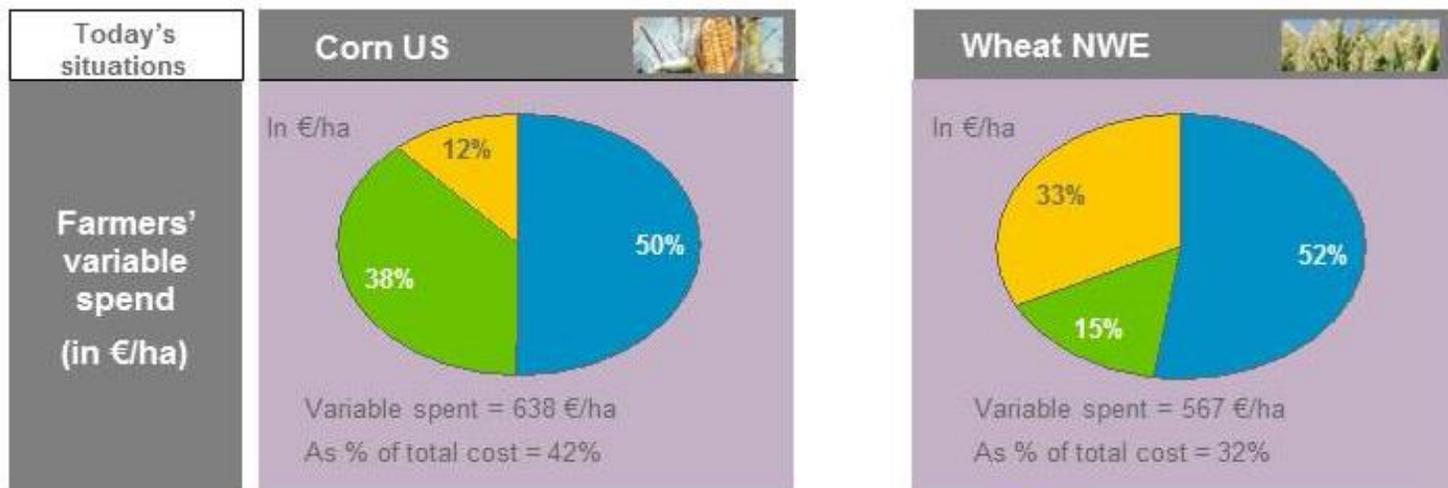


# Key trends driving adoption of digital solutions globally – different needs are giving rise to different solutions

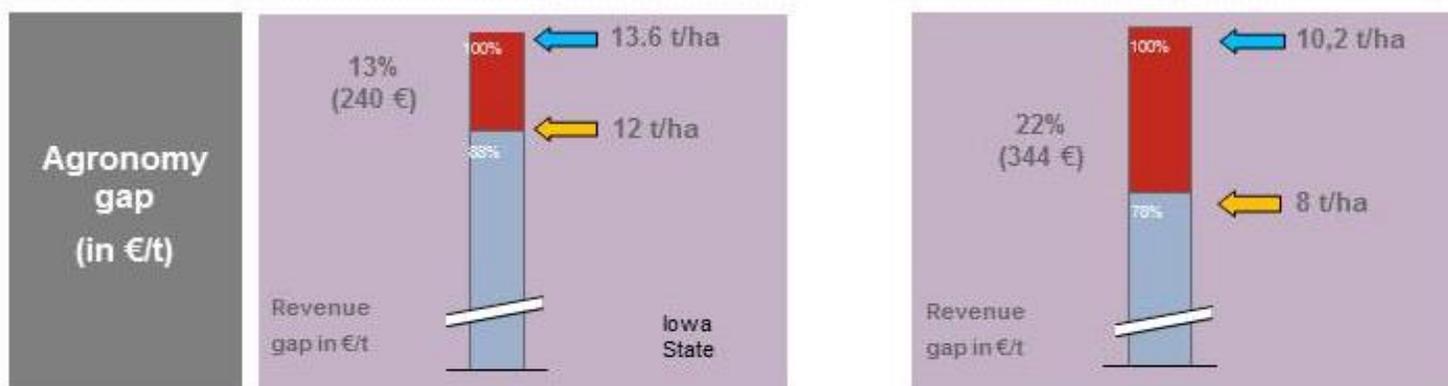




# Different crops, geographies offer different optimization potential



■ Fertilizer   
 ■ Seeds   
 ■ CP



← = top 10% average yield

■ Revenue gap   
 ← = actual average yield level

// Ensure relevance by providing solutions on key job steps //



Founded in 2014, Farmers Business Network (FBN) is a farmer-to-farmer agronomic information network.

Through crowdsourced data, FBN provides recommendations on seeds, fertility, and crop protection. In addition, it sells generic products directly in their platform as well as connecting farmers to buyers of their crop.

### **Key Points:**

- 17Mn Paid acres – one of the leaders in direct to farm engagement
- Raised ~US200 Mn funding to date (Temasek, Google Ventures)



Seed Finder

Price Transparency *New*

Analyze My Operation

Procurement

FBN Intelligence

My Data

FBN Performance

Trial Data

Search for variety



Crops: ▼ **Corn** | 
 Year: ▼ **All** | 
 State: ▼ **All** | 
 Relative Maturity: ▼ **70 - 129** | 
 Brand: ▼ **All** | 
 Soil Type:  Soil Type | Soils: ▼ **All** | 
 Previous Crop: ▼ **All** | 
 Irrigation: ▼ **All** | 
 Drainage: ▼ **All** | 
 Search

| Variety                                  | Relative Maturity (days) | Acres in FBN | FBN Avg. Yield (bu/A) | Typical Yield Range | Avg. Price per Bag | Approximate Price Range |
|--|--------------------------|--------------|-----------------------|---------------------|--------------------|-------------------------|
| <a href="#">STINE® - R9808E</a>          | 114                      | 2,494        | 253.7                 | 243.0 - 268.4       |                    |                         |
| <a href="#">DEKALB® - DKC63-72</a>       | 113                      | 950          | 243.7                 | 204.4 - 284.7       |                    |                         |
| <a href="#">GREAT LAKES - 6462</a>       | 114                      | 2,587        | 240.6                 | 227.2 - 259.1       |                    |                         |
| <a href="#">MYCOGEN® - 2J794</a>         | 115                      | 980          | 240.5                 | 233.1 - 252.8       |                    |                         |
| <a href="#">BECK'S™ - 5665</a>           | 106                      | 879          | 239.1                 | 229.3 - 251.5       |                    |                         |
| <a href="#">WYFFELS® - W7508</a>         | 113                      | 317          | 238.4                 | 217.7 - 262.3       |                    |                         |
| <a href="#">WYFFELS® - W7456</a>         | 112                      | 512          | 238.0                 | 220.8 - 260.1       |                    |                         |
| <a href="#">PRODUCERS HYBRIDS® - ...</a> | 112                      | 2,671        | 235.2                 | 225.1 - 247.2       |                    |                         |
| <a href="#">BECK'S™ - 6418</a>           | 114                      | 477          | 234.3                 | 230.6 - 239.2       |                    |                         |
| <a href="#">DEKALB® - DKC63-71</a>       | 113                      | 2,708        | 233.8                 | 211.7 - 255.3       |                    |                         |
| <a href="#">DEKALB® - DKC61-52</a>       | 111                      | 1,557        | 232.9                 | 209.3 - 263.1       |                    |                         |
| <a href="#">WYFFELS® - W8550</a>         | 114                      | 2,652        | 232.4                 | 217.0 - 252.0       |                    |                         |
| <a href="#">WYFFELS® - W7158</a>         | 111                      | 898          | 232.1                 | 216.0 - 253.9       |                    |                         |
| <a href="#">GOLDEN HARVEST® - F11...</a> | 113                      | 1,615        | 231.3                 | 226.0 - 236.4       |                    |                         |
| <a href="#">PRODUCERS HYBRIDS® - ...</a> | 116                      | 3,069        | 229.5                 | 216.2 - 249.5       |                    |                         |
| <a href="#">WYFFELS® - W7057</a>         | 111                      | 960          | 229.0                 | 226.7 - 250.7       |                    |                         |
| <a href="#">SPECIALTY® - 42V843</a>      | 112                      | 524          | 228.8                 | 226.1 - 242.3       |                    |                         |
| <a href="#">PIONEER® - P33Y75</a>        | 115                      | 857          | 228.7                 | 216.6 - 248.0       |                    |                         |
| <a href="#">GOLDEN HARVEST® - G10...</a> | 110                      | 464          | 228.7                 |                     |                    |                         |
| <a href="#">PIONEER® - P0825</a>         | 108                      | 4,494        | 228.3                 | 214.8 - 244.7       |                    |                         |
| <a href="#">GREAT LAKES - 6530</a>       | 115                      | 508          | 227.9                 | 204.9 - 250.1       |                    |                         |
| <a href="#">DEKALB® - DKC58-06</a>       | 108                      | 16,146       | 227.4                 | 215.2 - 246.7       |                    |                         |
| <a href="#">PIONEER® - P0937</a>         | 109                      | 3,532        | 227.3                 | 213.9 - 245.4       |                    |                         |
| <a href="#">PRODUCERS HYBRIDS® - ...</a> | 115                      | 9,281        | 226.7                 | 208.9 - 248.0       |                    |                         |

**To view Seed Prices,  
Contribute A Seed Invoice**

Your prices will never be exposed to other farmers. Prices are anonymized and aggregated to protect your privacy.

[+ Add Invoice to Unlock Prices](#)

Or simply snap a photo of an invoice and email it to [data@farmersbusinessnetwork.com](mailto:data@farmersbusinessnetwork.com)



# Farm X

90 fields | 7,603.56 acres

2016 | Corn | Benchmark My Region

- Overview
- Fields
- Varieties
- Planting
- Natural Features**
- Weather
- Yield Potential
- Maps

- Yield Analytics**
- Properties

## Soil Performance vs My Region

| Soil Type                       | SPI  | My Avg. Yield (bu/A) | My Operation vs My Region |
|---------------------------------|------|----------------------|---------------------------|
| <a href="#">Martinsville</a>    | 0.59 | 234.2                | +7.6%                     |
| <a href="#">Sawmill</a>         | 0.8  | 225.0                | +3.4%                     |
| <a href="#">Rutland</a>         | 0.59 | 225.4                | +3.4%                     |
| <a href="#">Virgil</a>          | 0.85 | 223.3                | +2.9%                     |
| <a href="#">Brooklyn</a>        | 0.82 | 223.8                | +2.6%                     |
| <a href="#">Catlin</a>          | 0.78 | 217.2                | -0.4%                     |
| <a href="#">Brenton</a>         | 0.9  | 215.3                | -0.8%                     |
| <a href="#">Dana</a>            | 0.81 | 215.3                | -0.9%                     |
| <a href="#">Millbrook</a>       | 0.9  | 213.1                | -1.9%                     |
| <a href="#">Drummer-Milford</a> | 0.79 | 213.5                | -2.1%                     |
| <a href="#">Harvard</a>         | 0.85 | 212.0                | -2.3%                     |
| <a href="#">Clare</a>           | 0.91 | 211.8                | -2.6%                     |
| <a href="#">Flanagan</a>        | 0.91 | 210.8                | -3.0%                     |
| <a href="#">Elburn</a>          | 0.91 | 208.4                | -4.0%                     |
| <a href="#">Milford</a>         | 0.81 | 207.7                | -4.5%                     |
| <a href="#">Reub</a>            | 0.88 | 207.4                | -4.7%                     |
| <a href="#">Plano</a>           | 0.95 | 206.9                | -4.9%                     |
| <a href="#">Pella</a>           | 0.7  | 205.6                | -5.4%                     |
| <a href="#">Proctor</a>         | 0.85 | 205.1                | -5.5%                     |
| <a href="#">Wyanet</a>          | 0.61 | 204.6                | -6.0%                     |
| <a href="#">Drummer</a>         | 0.84 | 203.7                | -6.2%                     |
| <a href="#">Toronto</a>         | 0.86 | 202.7                | -6.4%                     |



# East Field

83.29 acres

Year  Crop  Benchmark

- Overview
- Varieties
- Planting
- Natural Features
- Weather
- Yield Potential**
- Maps

Corn Soybeans Wheat 70 - 129 All Brands



| Soil Type                  | Acres       | Soil Productivity Index <span>?</span> | Top Performing Variety in FBN <span>?</span> | FBN Avg. Yield (bu/A) | 95% Confidence Interval | Relative Maturity (days) | Value/Acre <span>?</span> |
|----------------------------|-------------|--|--|-----------------------|-------------------------|--------------------------|---------------------------|
| <a href="#">Drummer</a>    | 33.73 (40%) | 0.84                                   | <a href="#">DEKALB® - DKC66-96</a>           | 263.6                 | +/- 39.76               | 116                      | \$ 875.15                 |
| <a href="#">Flanagan</a>   | 23.96 (29%) | 0.91                                   | <a href="#">CROPLAN® - 5415</a>              | 264.4                 | +/- 28.63               | 107                      | \$ 877.8                  |
| <a href="#">Raub</a>       | 22.50 (27%) | 0.83                                   | <a href="#">PIONEER® - P1311</a>             | 258.1                 | +/- 66.33               | 113                      | \$ 856.89                 |
| <a href="#">Clare</a>      | 1.75 (2%)   | 0.91                                   | <a href="#">DEKALB® - DKC62-08</a>           | 242.0                 | +/- 94.57               | 112                      | \$ 803.44                 |
| <a href="#">Dana</a>       | 1.49 (2%)   | 0.87                                   | <a href="#">CROPLAN® - 6265</a>              | 264.3                 | +/- 37.40               | 112                      | \$ 877.47                 |
| <b>Total: 83.43 (100%)</b> |             | <b>Avg. 0.86</b>                       |  | <b>Avg. 262.0</b>     |                         |                          | <b>Avg: \$869.83</b>      |

## Top Performers East Field's Soils

|  |                       |   |                       |   |                       |  |                       |
|--|-----------------------|---|-----------------------|---|-----------------------|--|-----------------------|
| <input checked="" type="checkbox"/> <b>Drummer</b> | FBN Avg. Yield (bu/A) | <input checked="" type="checkbox"/> <b>Flanagan</b> | FBN Avg. Yield (bu/A) | <input checked="" type="checkbox"/> <b>Raub</b> | FBN Avg. Yield (bu/A) | <input checked="" type="checkbox"/> <b>Clare</b> | FBN Avg. Yield (bu/A) |
| 1 DKC66-96-DEK                                     | 263.6                 | 1 5415-CROPLA                                       | 264.4                 | 1 P1311-PIONEER                                 | 258.1                 | 1 DKC62-08-DEK                                   | 242.0                 |



Founded in 2007, XAG is an drone / UAV spray and sensing manufacturer and service provider.

Provides various solutions –hardware, drone spray applications through partners, academy training on agronomy and drone piloting, and various crop insights through remote sensing

### **Key Points:**

- #2 Drone Spray service provider in China
- Holistic agronomy solutions

An aerial photograph showing a long, straight dirt road that curves slightly to the right, cutting through a vast, open landscape. The terrain is a mix of brownish soil and patches of green grass. In the distance, there are rolling hills and a clear blue sky. A dark-colored car is driving on the road, moving away from the viewer.

***XAIRCRAFT***

**P30**

PLANT PROTECTION UAS

P30en.mp4



# Competencies of various Smart Sprayer technologies

| Company   | Tech used         | Technology method   | Tech specifications  | On-farm problem being solved                                       | Estimated farm-level investment on technology  | Launch Year  |
|---|-------------------|---|--|--|--|--|
|    | Camera on sprayer | <ul style="list-style-type: none"> <li>Identifies green areas, maps it, correlates green = weed patch;</li> <li>Night spraying feasible</li> </ul>                                | Not crop specific  | Herbicide optimization<br><br>(mostly in pre-burndown application) | From Croplands Australia - PhantomDrive system retails Weedit Kit: Eur 80.000 (+GST) | In-market in Australia, Argentina, Brazil, Canada, Russia; USA |
|    | Camera on sprayer | <ul style="list-style-type: none"> <li>Identifies crop vs' weeds; weed in between planting rows</li> <li>Ink jet nozzles allowing centimeters of accuracy with 0 drift</li> </ul> | Tested in lettuce and cotton (0-12 inches)<br><br>Speed: 6-8 mph | Herbicide optimization   | -  | Estimated in 2019  |
|  | Camera on sprayer | <ul style="list-style-type: none"> <li>Identifies crop vs' weeds; mixes individual nozzle prep</li> <li>Has pre-mixing unit in entire spray system</li> </ul>                     | Not crop specific  | Crop Protection optimization                                       | -  | Estimated in 2019 +  |

Source: Market Research



**Nick Dubuc**

@NDubuc

Agricultural engineer (jr) + part-time farmer + agvocate + CTF enthusiast. Tweets are my own.

SW Quebec

Joined September 2010

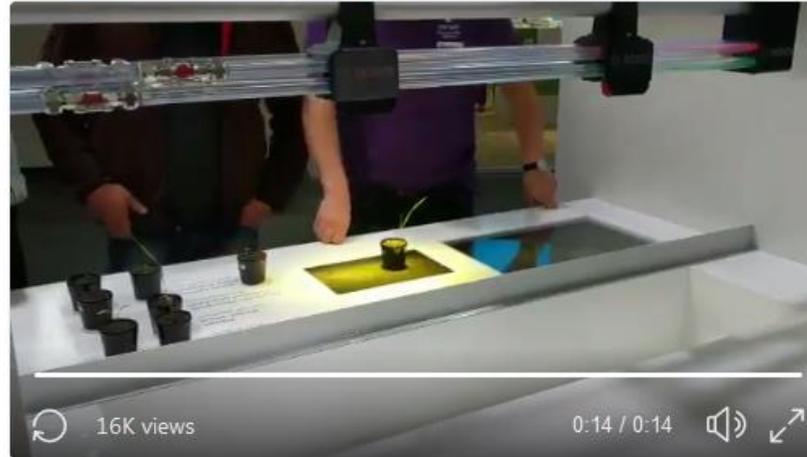


**Nick Dubuc**

@NDubuc

Follow

Bosch / Bayer xarvio Smart Sprayer.  
Detects which weed specie is present  
and selects herbicide accordingly.  
Available 2021 #agritechnica



16K views

0:14 / 0:14

2:30 PM - 14 Nov 2017

139 Retweets 232 Likes



9



139



232

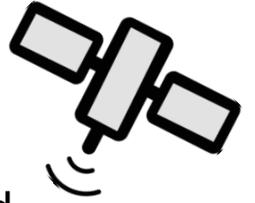


**Nick Dubuc** @NDubuc · 14 Nov 2017





# Bayer's driving principles in the area of Digital Farming



## Bayer's Know-how

Leverage our experience and expertise in **Agronomy in Seeds and Crop Protection**

Connect this expertise with Digital technologies to **solve** broader on-farm **problems**

## Motivation

**Make agriculture more sustainable** and **efficient.**

**Support farmers** to meet increasing challenges.

## Commitment

**Collaborations** in the development of digital solutions **to create innovative solutions** and technologies together with existing experts

## Focus so far

**Optimization of crop protection,** with measurable results and clear value at farm level



# Summary

- // Digital Farming is about solving an on-farm problem
- // Different solutions are already used in real life fields across the world
- // Start developing digital products **WITH** your farmers, not for your farmers