Using Data to Fine Tune Crop Management
Questions for you

• How many of you work with Growers to make Agronomic Decisions?

• How many of you work with Growers to make Fertility Recommendations?

• How many of you use more than just Soil Samples to guide Fertility Recommendations?

• If not why?
What is the future of data collection

- Sensors, Sensors and more Sensors?
- Increased connectivity?
- New telematics devices?
- Automated data capture?

- Let’s not focus on the future for a bit, Let's talk about the tools available Today!
History

Early 2000
- Grid Soil Sample and started collecting Yield Data

2010
- Grid Sampling and Collect All Application Data

Today
- Using technology to Fine Tune All Aspects of Agronomy
Data Layers used to Fine Tune our Agronomy

- Multi-Year Yield Analysis
  - Looking for trends
  - Identify areas of fields that may have greater yield potential

- Veris Data
  - Primarily looking at soil pH and OM
  - Need to understand variability better than we have in the past

- In-Our-Field Trials
  - What is the optimum population by soil type
  - Are we correctly managing N
Spatial Trends

• Shows yield potential for areas based on 12 years of yield data

• Green areas of the field show regions we are considering new treatments to maximize yield
Shallow EC to Spatial Trends
Temporal Stability

- Used to understand the likelihood of yield variability
- Defines areas of the field that may have other limiting yield factors than fertility or hybrid selection
Management Units

• Used to potentially define areas within the field to consider new management

• Exploring more intensive sampling of Below Average yield through Unstable regions
Shallow EC to Management Units
Soil pH to Management Units
More Data Points = More Learning
What Drove Change on Our Farm

- Multi-Year Yield
- “Dad” Factor
- Visual Differences
- Definition of “Insanity”
- Allow Data to Drive Decisions

*Insanity is doing the same thing over and over again and expecting different results.*

- Albert Einstein
New data points

• Logged weather data points
  • Relative humidity
  • Accurate rainfall data
  • More soil probes?

• Better grain handling/condition data

• Actionable Imagery data
Developing Tool to Further Fine Tune Agronomy

- LoRaWAN/IoT solutions
  - Weather data
  - Soil data
  - Plant data
  - ...

- Traceability tools
  - Grain Harvest
  - Planting
  - Crop Protection
The LoRa Ecosystem

Network Diagram

Concentrator
/Gateway

Network
Server

Application
Server

asset
tracking

gas monitor

water meter

trash container

vending
machine

fire detection

LoRa® RF
LoRaWAN™

TCP/IP SSL
LoRaWAN™

3G/
Ethernet
Backhaul

TCP/IP SSL
Secure Payload
LoRaWAN Networks

What should we connect?

- Weather Stations on every field
- Mobile assets
- Fixed Assets
LoRaWAN

• Opportunities for this technology abound
• Sensor technology is advancing everyday
• Stay tuned.....
• To learn more about LoRaWAN
  • https://www.lora-alliance.org/
Grain Harvest Traceability

• Why is it important?
  • Improve the QUALITY of Yield Data
  • Makes my life easier to reconcile settlement sheets and share when needed

• Work still needs to be complete to maximize value, but the finish line is near
AgGateway Grain Traceability PoC

- **2014**
  - We manually sorted hopper unload weights to verify production
  - The “Jeremy” intervention factor was near 100%
- **2017**
  - Added automation to logging every truck load
  - The “Jeremy” intervention factor was 40%
- **2018**
  - Add new hardware to make it “Easy”
  - Hoping the “Jeremy” intervention factor to drop to 20%
It’s Easy to Achieve!-2014
Harvest Data from 2014 PoC
How can we make this go away?
A Transfer Event is the movement or transfer of a product or commodity from one container to another container. Any transfer event can be specified by:

- A timestamp or data/time range that the transfer occurred
- Source container ID
- Target container ID

Harvest Transfer Events

Field -> Combine
Combine -> Cart
Cart -> Semi
Semi -> Elevator
Truck -> Bin
"Inbound" – Use Case 1

ISO 11783 - 10 → Grain Cart 1 → Grain Cart 2 → Semi Trailer 1 → Grain Storage 1

On-farm Storage

Grain Cart 1
Load 1
Load 2

Grain Cart 2
Load 1
Load 2

Semi Trailer 1
Load 1

Harvest

1st Transport Vehicle(s)

2nd Transport Vehicle(s)
“Inbound” – Use Case 2

ISO 11783 - 10

Grain Cart 1
Load 1
Load 2

Grain Cart 2
Load 1
Load 2

Semi Trailer 1
Load 1
Load 2

2nd InBound Transport Vehicle(s)

Grain Elevator

Harvest

1st InBound Transport Vehicle(s)

AgXML
“Outbound” – Use Case 3

AgXML

Grain Elevator → 1st Outbound Transport → Food Processor

Load 1

Semi Trailer 1

Semi Trailer 1
Gateway Device reports the Cart is near
Gateway Devices
Beacons
More Beacons
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<th>End</th>
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Planting Traceability

• Why is it important?
  • Traits with seeds can impact Fame or Failure
  • Tools needed to document seed planted and lot number

• Data captured here can impact Agronomic choices in the near future

• Oh By The Way, Sprayers could get smarter.
Now What??
Future in Jeremy’s Eyes

• Our farm will continue to add more layers of data to drive Agronomic decisions

• Agronomic decision will still be made by people, but the people will be smarter because of technology

• Cost of connective will continue to decrease, so stop and think of what can be learned by connected “Stuff”

• $3 Corn and $8 Soybeans will require all of us to better manage EVERY input on the farm today.
Summary

• Are you willing to tell the farmer to make the changes he needs to make when the data tells you to make this change?

• Are you willing to learn how to apply the knowledge you just learned from the new layer of data just captured?

• Be the Service Provider who can Fine Tune a Grower’s practices to Maximize Profits!
Questions?

Thanks for the opportunity speak!

JEREMY W. WILSON
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