Scott Magnan’s Introduction:

I grew up on a dairy in St. Albans which milked about 50 cows. I attended Morrisville College completing an associates degree in Automotive technology in 1996. In 1997 I started my business offering custom crop services which at the time only included manure spreading, we have grown that part of the business to include many additional services including roundbaling, mowing, bunk packing, and planting. The custom operation provides services for a spectrum of operations from large dairies to small beef cow operations with just a few animals. We farm about 200 acres of crops ourselves which include corn, hay and sunflowers, we have also rotated small grains and soybeans into the rotation at times. In 2012 we started using GPS monitors to track manure application dates and fields as a way to better support the farmer in nutrient management planning, we had difficulties finding expertise in this area to accomplish our goals; in 2014 we sought to become a dealer for AgLeader technology and attended software training and in 2015 accomplished that goal and continue to have a working relationship with that company presently. This has opened the door not only to set new standards in our operation but to also assist other farmers with the setup installation and use of the technology. We have a CWIP grant through the Vermont Agency of Agriculture which allows us to offer training and support in this venture as well. I am the current chair for the Farmers Watershed Alliance for Franklin and Grand Isle county, a group that works with farmers to address water quality. I look forward to meeting your group tonight and hope to answer your questions and plan to use the materials as a reference to what I work on without going into deep detail.
Vermont

-Each acre of Vermont Soils has variability unique to the next, Precision Agriculture provides tools to identify, manage and lessen the variability found within this challenge.

-Laws and regulations require mandatory records

-All coverage maps in the presentation are from technology we are currently utilizing or trialing in this state
FIELD COMPUTERS & DISPLAYS

THE HEART OF A PRECISION AG OPERATION

Monitor, control, and record practices
GPS RECEIVER

GPS SIGNALS

**WASS**: Free, 6”-12” accuracy, poor repeatability

**OMNI STAR, TERRA STAR**: Paid services 4”-8” accuracy, good repeatability

**RTK**: Sub 1” accuracy, good repeatability, requires base station or access to an RTK network
Progression timeline

- Initial investment: prioritizing one practice
  - Manure application monitoring for example

- Data investment for analysis and reporting
  - Cloud program
    - Software
    - Advisor

- Secondary investments in the field
  - Planting
  - Steering
  - Harvest
  - Soil profile

- Integration/Evaluation/Utilization
  - Query tools
    - Prescriptions
    - Advisor meetings
    - Farm based decision
    - Leveraged negotiating

- Apply well informed rate information to your field based on the data layers you have recorded.
Acting with precision

What needs to be addressed?

What tool do we need for the job?
Steering Systems
Often difficult to pick up row marker lines in no-till
Subsurface Fertility in No-till With Precision
Control allows for slow speed at desired rate
STRIP TILL, Cultivating

- By adding fertilizer application tools during these practices, we address subsurface fertility, weed control and compaction in one operation.

- We need good pass to pass accuracy. A subscription service will be needed, RTK is recommended.

- Recorded and labeled guidance lines will help track nutrient placement for future reference and planning.
Strip till fertilizer application
Cover Cropping

Pictured is an inner seeder that could be enhanced with a steering system and seed tube monitoring, same principles would apply to a grain drill or even broadcasting.
Air Seeder
Air Seeder Map

Even coverage with ability to set a rate, used with automatic swath control and assisted steering.
Planting With Precision
DOWNPRESSURE

Spring
Applies constant pressure with only manual adjustment

Pneumatic
Applies down force to the row unit but takes several feet to adjust.

Hydraulic
Applies down force to row unit within a second.
Monitored and spring adjusted downforce
Tilled field, Gauge wheel pressure
Down pressure applied

- Planted field road
- Compaction Map
- Potential soft spot
- Ledge
- Variability in seed bed
Poor fertility + Poor Planter Setup=Lost revenue, less nutrient uptake

Down pressure sensor data would have identified increased up pressure on the row unit from floating row cleaner
When soil health and planter setup are addressed you get positive results
Moving and Managing Data

CAN BE MOVED WITH A USB OR WIRELESSLY

DISPLAY

SOFTWARE
Quick accurate record keeping
- Increased efficiency when filing reports
- Enhances funding opportunities for your no-till operation
- Provides a tool for sound decision making
Weed Control

Liquid application tools provide exact rate control and automatic shutoff of product.

Steering control for application of products as well as improved efficiency and accuracy when using cultivation tools.
In this photo a steering system was used while planting and again when cultivating using a flat cultivation point for minimal soil disturbance and weed control.
Common on combines and found locally on some choppers, Yield monitoring is a very important piece in fully utilizing all the precision tools on your farm. With that data we gain the ability to identify gains and drops in yield. From there field improvements can be made, equipment issues identified, and plans can be made to utilize inputs as efficiently as possible.
2019 Variable rate planting trial
2 soil types within the field
Lordstown - well drain loam
Massena - Poorly drained heavier soil
2019 yield data
Winner!
Why?
Was population the key factor?
Down pressure 20.52lbs  Yield 117b/u
Down pressure 64.68lbs  Yield 153BU
<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Yield (Dry) (bu/ac)</th>
<th>Moisture (%)</th>
<th>Area (ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lordstown</td>
<td>123.9</td>
<td>24.26</td>
<td>5.25</td>
</tr>
<tr>
<td>Massena</td>
<td>116.7</td>
<td>23.77</td>
<td>3.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>121.2</strong></td>
<td><strong>24.07</strong></td>
<td><strong>8.47</strong></td>
</tr>
<tr>
<td>Population (kads/ac)</td>
<td>Yield (Dry) (bu/ac)</td>
<td>Moisture (%)</td>
<td>Area (ac)</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------</td>
<td>---------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Below 24.00</td>
<td>100.1</td>
<td>23.83</td>
<td>0.861</td>
</tr>
<tr>
<td>24.00 - 27.00</td>
<td>117.6</td>
<td>23.78</td>
<td>1.59</td>
</tr>
<tr>
<td>27.00 - 30.00</td>
<td>125.6</td>
<td>23.94</td>
<td>1.13</td>
</tr>
<tr>
<td>30.00 - 33.00</td>
<td>127.1</td>
<td>24.04</td>
<td>1.45</td>
</tr>
<tr>
<td>33.00 - 36.00</td>
<td>134.3</td>
<td>24.25</td>
<td>1.32</td>
</tr>
<tr>
<td>Above 36.00</td>
<td>124.8</td>
<td>24.24</td>
<td>1.29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>122.7</strong></td>
<td><strong>24.02</strong></td>
<td><strong>7.63</strong></td>
</tr>
</tbody>
</table>
Map predetermined rates for seeding, fertilizing and manure application using a software program.

Base the prescription on a variety of map layers and previously recorded data.
**Productivity Index Based Planting Prescription (Corn and Soybeans)**
This equation calculates a ratio between Grain Harvest data for corn and soybeans and the National Commodity Crop Productivity Index (NCCPI) from United States Soil Survey data, and helps you create three management zones to apply different planting rates for corn or soybeans.

**Cornell University® Corn Recommendation**
This equation calculates how much corn to plant based on desired harvest population, soil survey information, and location of installed tile.
2020 Fertilizer P Prescription based off 2019 crop removal
Variable rate fertilizer application
Questions?
• Scott Magnan
• Email scttmgnn@gmail.com
• Phone (802) 363-7707