Potential Power of Data Management

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Emerging Digital Ag Ecosystems

Source: Lisa Prassack
**Digital Ag Technology Industry in North America**

COMPANY RESEARCH

113 unique companies / tools identified (2017). Each company was grouped into at least one of the categories listed below.

<table>
<thead>
<tr>
<th>Digital Tool Category</th>
<th>Number of Companies Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Data Warehousing</td>
<td>35</td>
</tr>
<tr>
<td>2  Production Analysis</td>
<td>32</td>
</tr>
<tr>
<td>3  Production Benchmarking</td>
<td>15</td>
</tr>
<tr>
<td>4  In-Season Monitoring</td>
<td>19</td>
</tr>
<tr>
<td>5  Crop Modeling</td>
<td>6</td>
</tr>
<tr>
<td>6  Recommendations</td>
<td>13</td>
</tr>
</tbody>
</table>
Digital Tech Adoption by Farmers

90% Sharing Data today
  o 66% sharing data with 2 or more people
  o Seed Rep and Agronomic Consultant (>60% sharing with both)

50% find value in data warehousing and recommendations (Rx)

(2017 USB farmer survey on Digital Technologies)

FARMER RESPONSES

Farmers are actively using technology in soybean production.
  • 77% view variety results online (67% with a smartphone or tablet).
  • 96% are using data collected as a direct input for management decisions.
  • 91% are using some type of digital tool or service.
  • 88% use prescription maps for managing inputs such as seeding or fertilizers.
Precision Ag Services Offered

Way Dealers Manage Farm-level Data
**Management Decisions Influenced from Pooled Data**

- **Nitrogen decisions**: 17% No answer, 44% No influence, 29% Some influence, 10% Major influence on decision
- **P and K decisions**: 18% No answer, 39% No influence, 32% Some influence, 11% Major influence on decision
- **Liming decisions**: 29% No answer, 34% No influence, 28% Some influence, 9% Major influence on decision
- **Overall hybrid or variety selection**: 20% No answer, 40% No influence, 32% Some influence, 7% Major influence on decision
- **Variable hybrid or variety placement in field**: 31% No answer, 39% No influence, 22% Some influence, 8% Major influence on decision
- **Overall crop planting rates**: 25% No answer, 43% No influence, 27% Some influence, 3% Major influence on decision
- **Variable seeding rate prescriptions**: 33% No answer, 38% No influence, 22% Some influence, 3% Major influence on decision
- **Pesticide selection (herbicides, insecticides, or...)**: 23% No answer, 42% No influence, 30% Some influence, 4% Major influence on decision
- **Cropping sequence/rotation decisions**: 37% No answer, 37% No influence, 25% Some influence, 2% Major influence on decision
- **Irrigation decisions**: 55% No answer, 30% No influence, 11% Some influence, 3% Major influence on decision
- **Other**: 85% No answer, 10% No influence, 15% Some influence, 0% Major influence on decision

**% of respondents**

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**Digital Toolbox to Execute and Learn**

**APPs / Data Collection**
- Climate FieldView Cab
- Farmobile
- Raven SlingShot
- MyJohnDeere
- Weather Op
- Ohio State PLOTS
- Various imagery providers

**Software**
- SMS Advanced
- Beck’s FarmServer
- Pix4D
- ArcGIS
- BOX
- ADC Account

#NutrientIntel
Best Practices to Managing Farm Data

Core to the Farm Digital Strategy

- Save
- Secure
- Share

Basis for a Digital Strategy

1. Identify technologies being used and data generated.
2. Stored data is organized (Year, Crop, Farm, Field)
3. An original copy of data is able to be stored both on-farm and off-farm, so that a backup is available.
4. Data can be accessed from a convenient location (from the cloud, on a phone or tablet, at a desktop computer, etc.) and updates offline information when a connection is available if required.
5. All data collected is complete and of sufficient quality to execute desired analyses.
6. Collected data should be protected with secure passwords and not shared without permission.
7. Determine a strategy to share files on and off the farm to capture new insights and learnings.
   - Data is in a format that is easy to copy and/or share with trusted advisors and precision ag services.

Value comes from using data.
Data Types

On-farm data comes from a variety of sources

- **Agronomic**
  - Yield
  - As-Applied
  - As-Planted

- **Machine**
  - Fuel Usage
  - Engine Speed
  - Engine Load

- **Prescription**
  - Seeding
  - Fertilizer
  - Multi-hybrid
  - Fungicide

- **Remote Sensed**
  - Visible (RGB)
  - IR
  - NDVI
  - Thermal

- **Production**
  - Weather
  - GDD
  - Dates
  - Markets

Identify what data is being generated on-farm.
As-Planted Evaluation

Zone Delineation  Prescription  Execution / Verification

“Directed” Sampling and Scouting Sites
COLLECT IN-SEASON DATA

Machine Data
Fuel Use, Engine load, Speed, Torque

Field Operations --- planting, spraying, fertilizer, harvest

<table>
<thead>
<tr>
<th>Engine load</th>
<th>Oil Pressure</th>
<th>Speed</th>
<th>Fuel Rate</th>
<th>Engine Torque</th>
<th>Engine Speed</th>
<th>Engine Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>84%</td>
<td>76.6 psi</td>
<td>10.4 mph</td>
<td>18.02 gal/hr</td>
<td>81%</td>
<td>1729 rpm</td>
<td>198°F</td>
</tr>
</tbody>
</table>
#CompactIntel – Harvest Operation

Identify potential zones of soil compaction.

NDVI Image
July 29, Corn

#CompactIntel
Verification

Y-drop LSN
Y-drop sidedress
Zero
Identify varying soil OM, CEC, water holding capacity, and texture.

“Terra” Project

39 different file types
2475 different files
60.2 Petabytes for the field

- *.TXT
- Shapefile (*.shp)
- *.XML
- *.DAT
- *.agdata
- *.yld
- *.giz
- *.rbin
- *.log
- Many others...
**Example: Field Collected Data**

As-Applied Map (Fertilizer)

Source: Raven Viper

File Format: *.rbin

**File Elements:**
- Date
- GPS locations
- Applied rate
- Elevation
- Ground speed
- Product
- Other...
Example: Field Collected Data

As-Planted Map
(kseeds/ac)

SOURCE: Precision Planting 20/20
FILE FORMAT: *.DAT

FILE ELEMENTS:
- Date
- GPS locations
- Planted rate
- Hybrid
- Ground speed
- Singulation
- Other...

Valued Data Layers

Food, Agricultural and Biological Engineering
SUMMARY

Sharing data with trusted advisors will increase over the next few years but there remains a complexity to implementation.

Farmers using digital technologies find value in them today.

Data will turn to information for someone.

#DataIntel  #NutrientIntel
eFields represents an Ohio State University program dedicated to advancing production agriculture through the use of field-scale research.

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