

Precision Agriculture in Upstate NY: An Overview

Precision Agriculture (**Precision Ag**) systems hold great potential, however further development is needed for their optimal implementation on the farm.

This poster will address the unique challenges faced by farmers seeking to implement Precision Ag systems in their farm operations.

What is Precision Ag?

Precision Ag Defined

Precision Ag systems are agricultural information systems that combine Geographic Information Systems (GIS) and Global Positioning Systems (GPS), with guided information recording equipment capable of monitoring and controlling agricultural machinery (i.e. combine, spreader, sprayers).

Precision Ag Systems Aid Field Scouting

In theory, Precision Ag systems have the capacity of capturing and storing data about a farm's soil, historic yield data and product performance with sub-inch (precise) accuracy.

Precision Ag Systems in Planting & Fertilizer/Chemical Applications

In addition to data capturing, Precision Ag systems allow for autopilot steering of farming equipment, and sub-inch accuracy for variable rate planting, fertilizer and chemical applications.

Potential of Precision Ag Systems

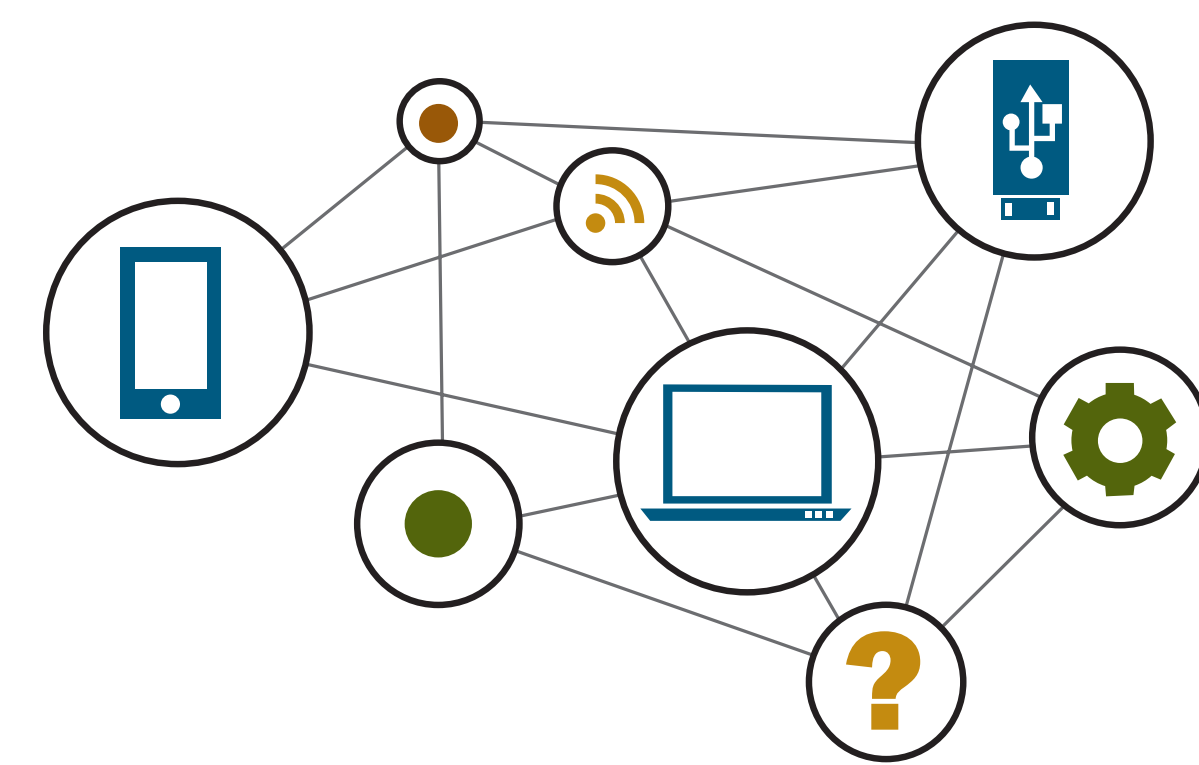
Precision Ag systems provide new information about the farm like never before. Using technology and this new information, farmers will be able to make better decisions (environmental and economically viable) for their farm operation.

Research Analysis

The information used for the development of this poster is based on a case study analysis from 10 different farm operations implementing Precision Agriculture systems in Upstate New York from 2011-2012.

Precision Ag Information Cycle

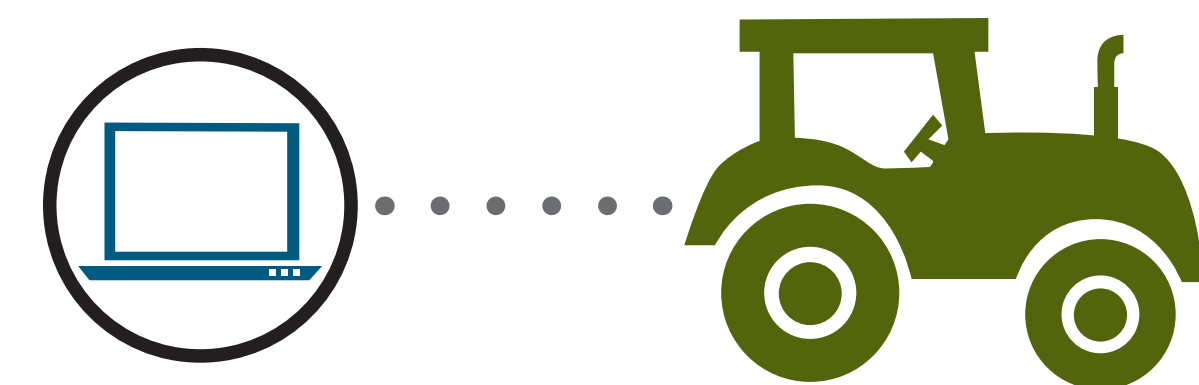
1. Automation of machine operations



+ Automation of machine operations will reduce operator fatigue & increase precision of input use.

- A steep learning curve of new technology & lack of troubleshooting support. Operation of new controllers represents a recent change in job function for farm workers who tend to be excellent mechanics, but lack experience with computer interfaces.

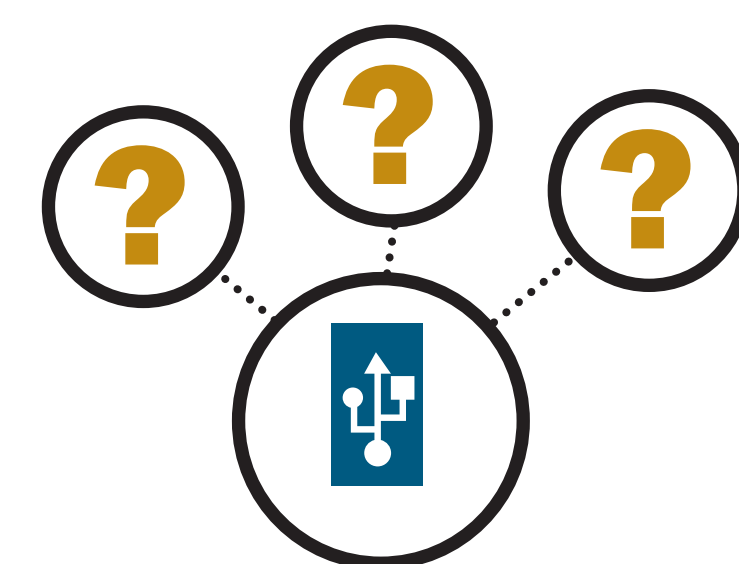
2. Harvest Monitoring/Data Recording



+ Robust data capturing to make more informed & efficient input decisions. Provides the base for other precision agriculture applications.

- Correct calibrations are difficult & time consuming, frequent data reading errors can result in unusable information.

3. Data Import and Analysis



+ New information, based on captured data, allows for informed management decisions based on analysis of harvest data (i.e. choice of crop, fertilizer rate, herbicide application timing).

- Precision Ag software are still developing. Analysis can require a great investment of time and money. Outsourcing of analysis can result in conflict of interest (i.e. Sales person conducts analysis to recommend input purchases).

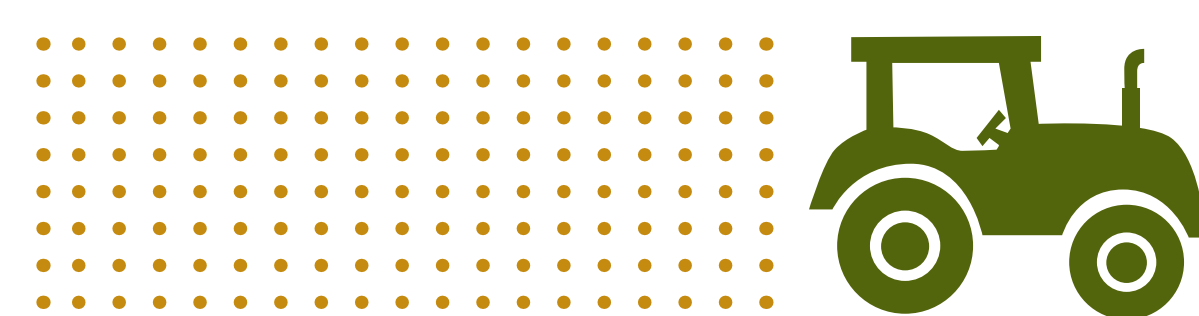
4. Changeable decision making environment



+ Utilizing precise historical soil/crop data, growers can better prepare for changing conditions.

- Applying a high level of precision to an industry with changeable variables (i.e. weather, live plants), there is a need for systems that are precise, but also flexible & adaptable.

5. Taking action



+ Assuming the successful navigation of all the previous challenges, inputs (i.e. fertilizer) are optimally placed, & not applied to areas with low production potential.

- Corruption of data file(s) due to loss of signal or incorrect machinery calibration can potentially render the data useless.

6. Result



+ Greater efficiency in agriculture that combines, machinery, farming know-how, & cutting edge information systems.

- Lack of data consistency/dominant design, lack of product support, Precision Ag systems require precision users, rigid information system structures in a very changeable environment.

Before Precision Ag

Universal seed, fertilizer or chemical rates are applied to a given field. Any variation is manually applied.

With Precision Ag

Through site specific capturing of topographic, soil, and production data analysis, the farmer can potentially apply the optimal amount of seed, fertilizer, and chemical to each section of their fields.



THE FARMER & PRECISION AG SYSTEMS

IT DIFFERS FROM FARM TO FARM

The use of Precision Ag systems differs from farm to farm. Of the 10 farms analyzed, each one is using Precision Ag systems at a different capacity (i.e. only for autosteer of machinery, or autosteer & rate control, or autosteer, rate control and data capturing).

THE DIGITAL DIVIDE

Farm work seldom involves computers. As a result, farm workers will struggle to use these advanced computer systems. All 10 farmers outsource the programming of Precision Ag systems (i.e. set-up and analysis) to independent consultants/machinery dealerships. This practice can leave the farmer vulnerable to the analysis of third party vendors.

FINDINGS

1. Of the 10 farms reviewed for this case study, none have staff with training in agronomy, topography, GIS/GPS enabled technology, statistics, and first-hand knowledge of the field, required to successfully interface with the complete system.
2. As a result of climate change, climate variability, and many external and unexpected factors that may alter what a farmer is able to do during a particular farming cycle, such precise data may become irrelevant overnight.
3. Precision Ag systems lack standardization of data types and interoperability across controllers and machinery. The emergence of a market standard is far from sight.
4. These systems will eventually play an important role in increasing operational efficiency, but currently they are not a simple transition for the average farm.

NEXT STEPS

The agriculture community has remained somewhat isolated from other fields and professions, partially as a result of distance to large population centers and partially due to the distinct way of life. However, with this technological revolution, it will be important to forge new partnerships across agriculture, machinery, and information technology.

Further independent research and development is needed. **We urge information professionals to consider this field!**

For questions and more information, please contact:

Pamela Espinosa de los Monteros, paespino@syr.edu
Graduate Student, Library & Information Science
SYRACUSE UNIVERSITY

Daniel Ochs, daniel.ochs@fulbrightmail.org
Precision Agriculture Specialist
B.S. Applied Economics & Management Program
College of Agriculture & Life Sciences
CORNELL UNIVERSITY

Special thanks to Jeff Passetti for Graphic Design