CLIMMAR
Centre de Liaison International des Marchands de Machines Agricoles et des Réperateurs

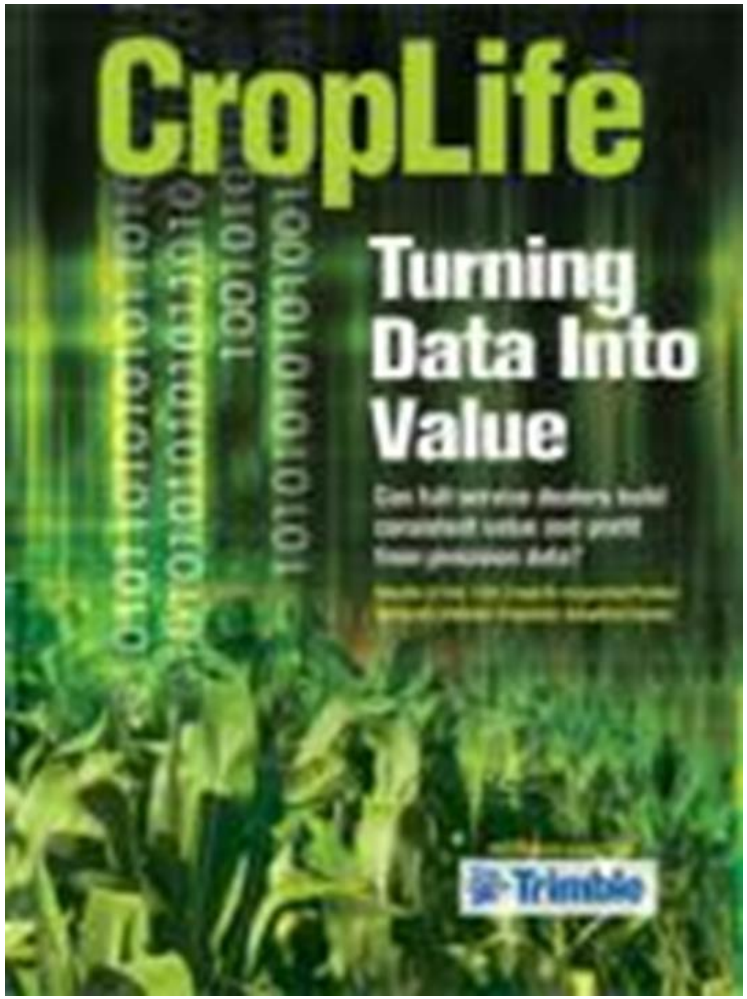
Precision Farming Adoption Trends and Analysis

CLIMMAR Congress

October 2016—Venice, Italy

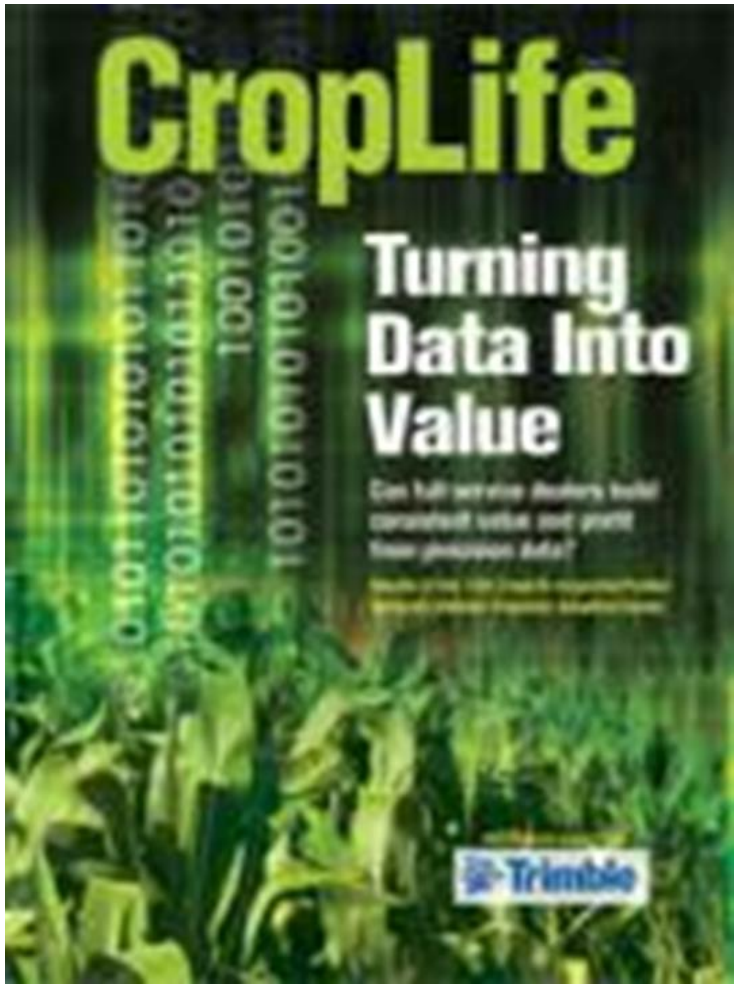
PURDUE
AGRICULTURE

CropLife/Purdue Precision Dealer Survey



- Originated 1996
- 2015 was 17th survey
- Working now on 2017 survey
- Adoption information difficult to obtain

CropLife/Purdue Precision Dealer Survey



2015
PRECISION AGRICULTURAL SERVICES DEALERSHIP SURVEY RESULTS

SPONSORED BY *CROPLIFE* MAGAZINE AND THE CENTER FOR FOOD AND AGRICULTURAL BUSINESS

by

Dr. Bruce Erickson and David A. Widmar

July 2015

Dept. of Agricultural Economics/Dept. of Agronomy

Purdue University

Bruce Erickson is the Agronomy Education Distance & Outreach Director at Purdue University, West Lafayette, IN. David A. Widmar is the Senior Research Associate for the Center for Commercial Agriculture at Purdue University, West Lafayette, IN.

Today's Precision Farming

Position Dependent

- Depends only on field position to make decisions
- Main benefit cost savings
- Adoption easy

GUIDANCE

SECTION CONTROLLERS

Position and Data Dependent

- Depends on field position and field characteristics
- Benefits cost savings and yield increases
- Adoption more difficult

SOIL MAPPING

YIELD MAPPING

VARIABLE RATE TECH

BIG DATA

Position Dependent

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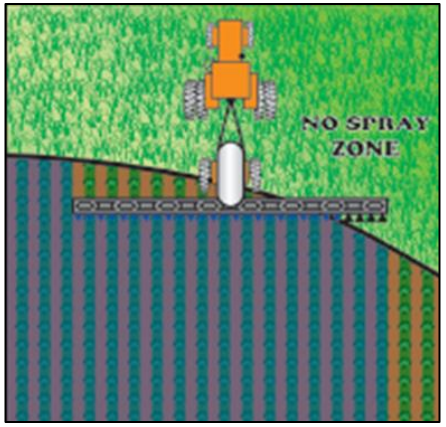
GUIDANCE

SECTION CONTROLLERS



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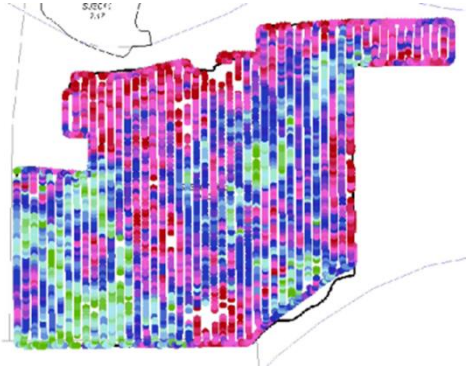

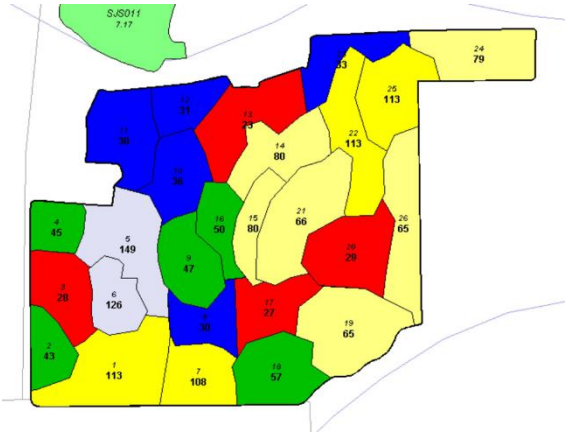

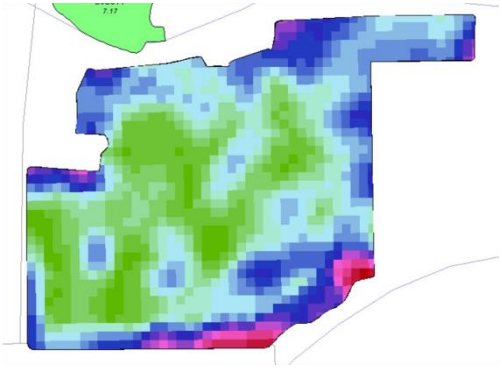

Position and Data Dependent

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SOIL MAPPING

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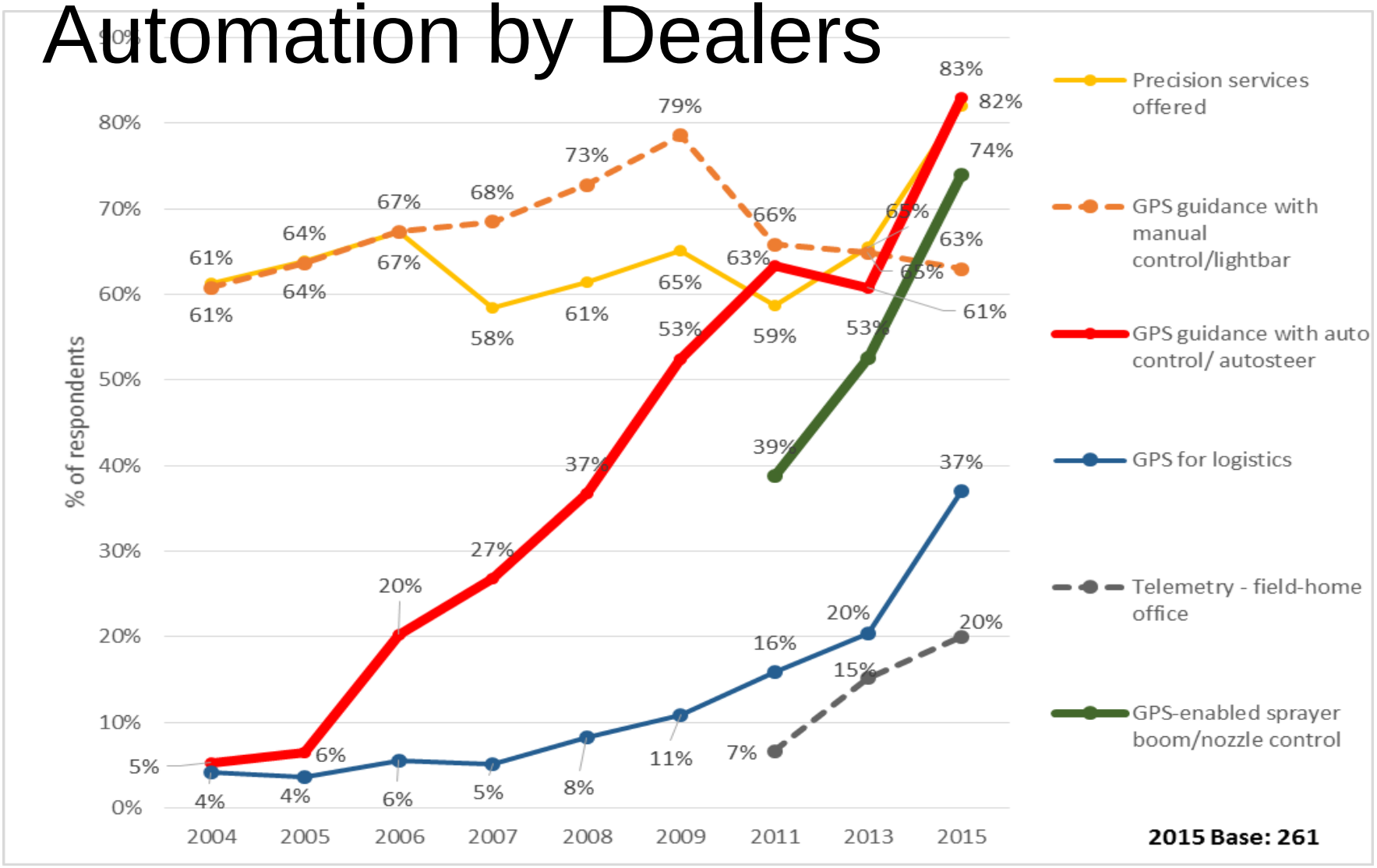
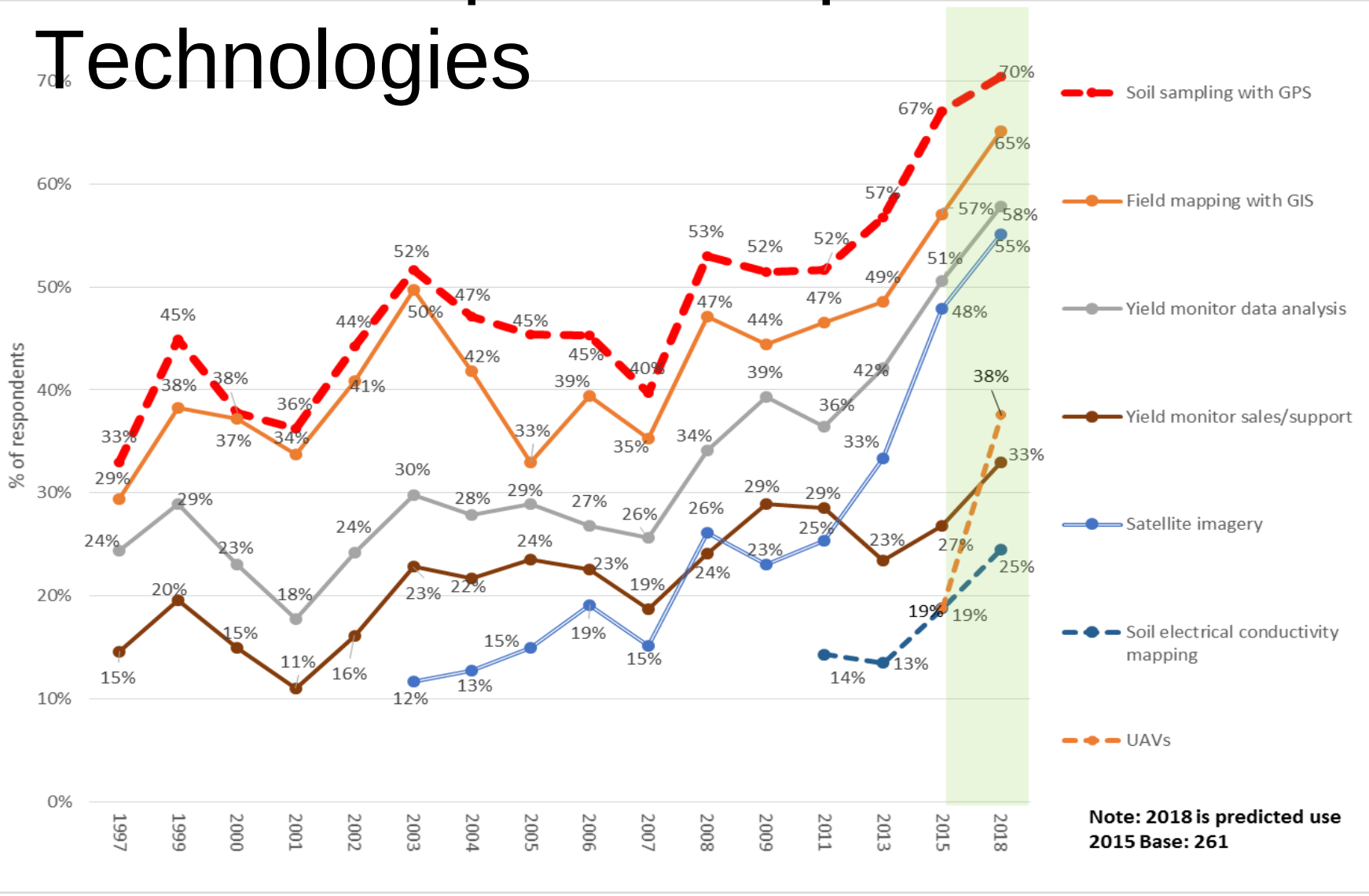
BIG DATA

Rapid Adoption of Guidance and Automation by Dealers



Slower Adoption of Spatial Technologies



Benefits of Guidance and Section Controllers Vary with Field Size and Shape, Equipment Configuration

2013 JOURNAL OF THE ASFMRA

Economics of Precision Agricultural Technologies Across the Great Plains

By Craig M. Smith, Kevin C. Dhuyvetter, Terry L. Kastens, Dietrich L. Kastens, and Logan M. Smith

ABSTRACT

Precision agricultural technologies, such as guidance systems and automatic section controllers, have given farmers the ability to more effectively apply crop inputs such as fertilizer, pesticides, and seed. More efficient use of inputs often can be translated into higher yields and/or lower costs, but the costs and benefits likely vary across regions. Our research incorporates over 500 real-world cropland fields from farms in Colorado, Kansas, and Nebraska to help answer the research question: What are the economics of investing in guidance systems and automatic section controllers for sprayers, and how do these vary across different regions of the Great Plains?

C.M. Smith is an Assistant Professor in the Department of Agriculture at Fort Hays State University. K.C. Dhuyvetter is Professor in the Department of Agricultural Economics at Kansas State University in Manhattan, KS. T.L. Kastens is Professor Emeritus and producer with Kastens Inc. Farms in Herndon, KS. D.L. Kastens is a producer with Kastens Inc. Farms in Herndon, KS. L.M. Smith is a Kansas Academy of Mathematics and Sciences (KAMS) Student and producer with Smith Brothers Inc. Farms in Richfield, KS.

KAMS is the state's premier academic high school program for the state's best and brightest high school students. Where students get college-level instruction by Ph.D. faculty, a high school diploma, and 60 hours of college credit, and are also involved in hands-on research supervised by Ph.D. scientists.

The authors would like to recognize the 2011-12 students of Fort Hays State University's "Technology in Agriculture" (AGRI 400) course as well as the support of the PrecisionAg Institute (www.precisionag.com) in the development of this analysis.

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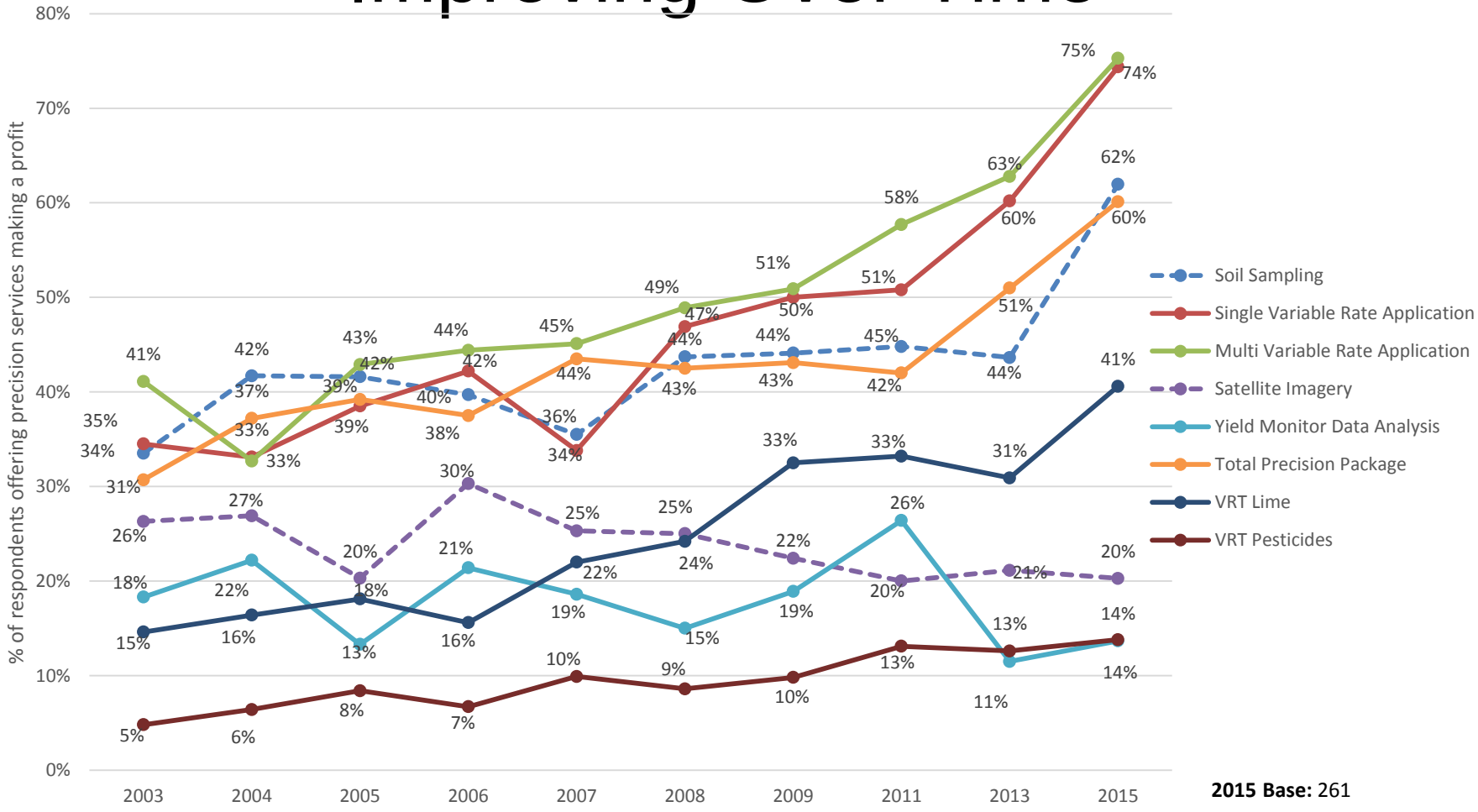
http://www.asfmra.org/2013-journal-of-the-asfmra/

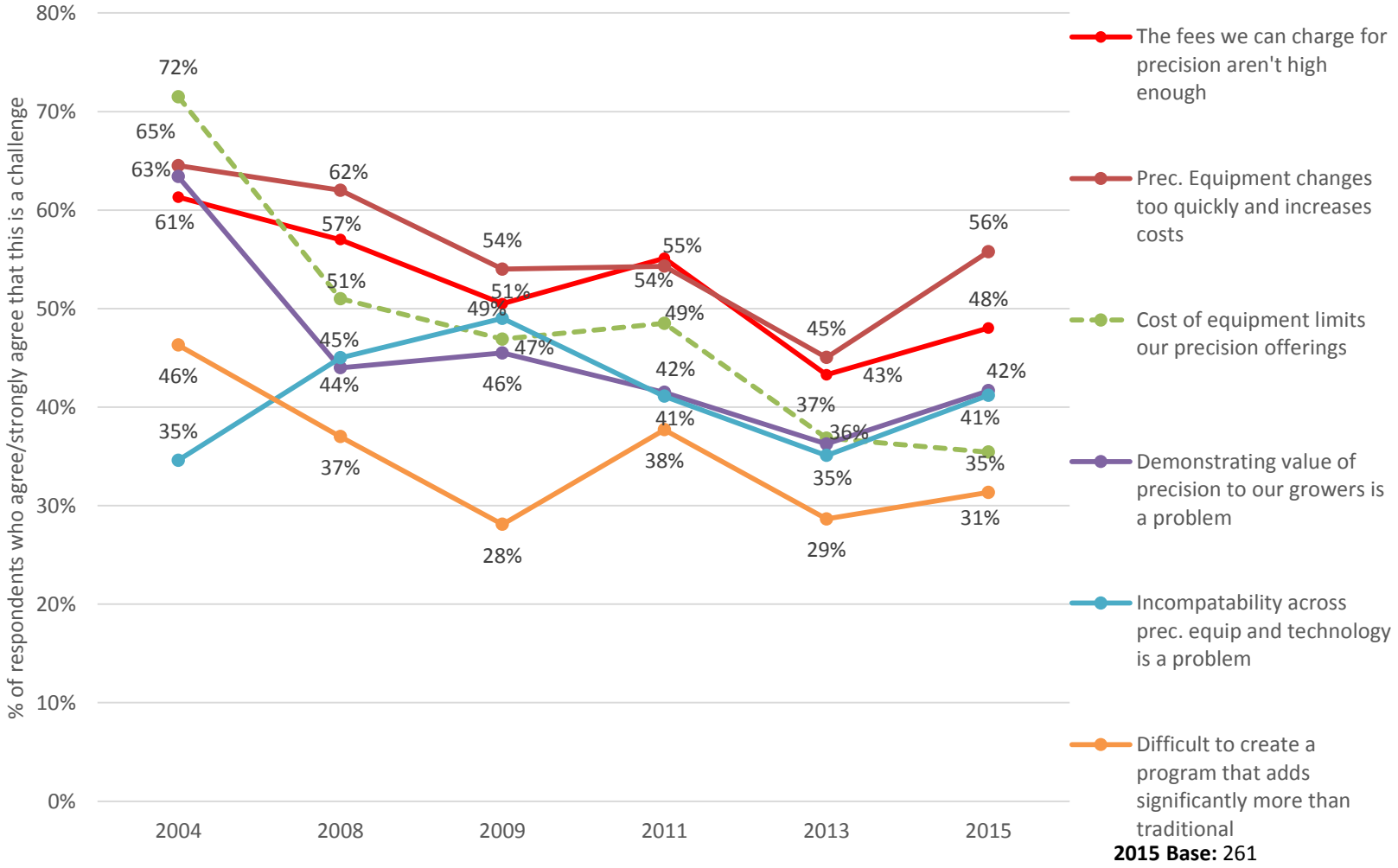
Guidance: Biggest Advantage with Small Implements in Large Fields

Section Controllers: Biggest Advantage in Smaller Fields, More Irregular Field Edges

Dealer Precision Profitability Improving Over Time

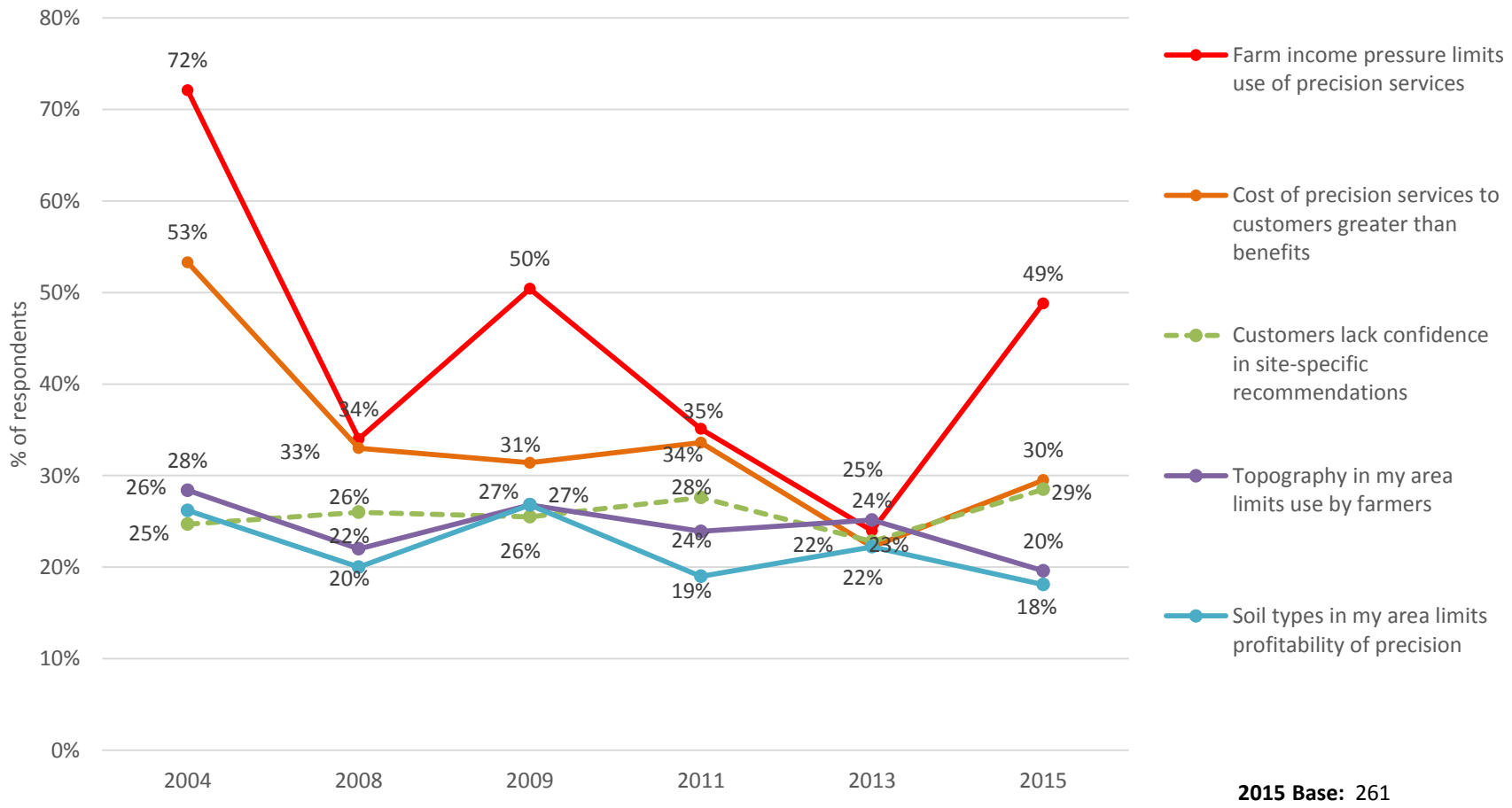


Dealer Barriers to Adoption



2015 Base: 261

Customer Barriers to Adoption



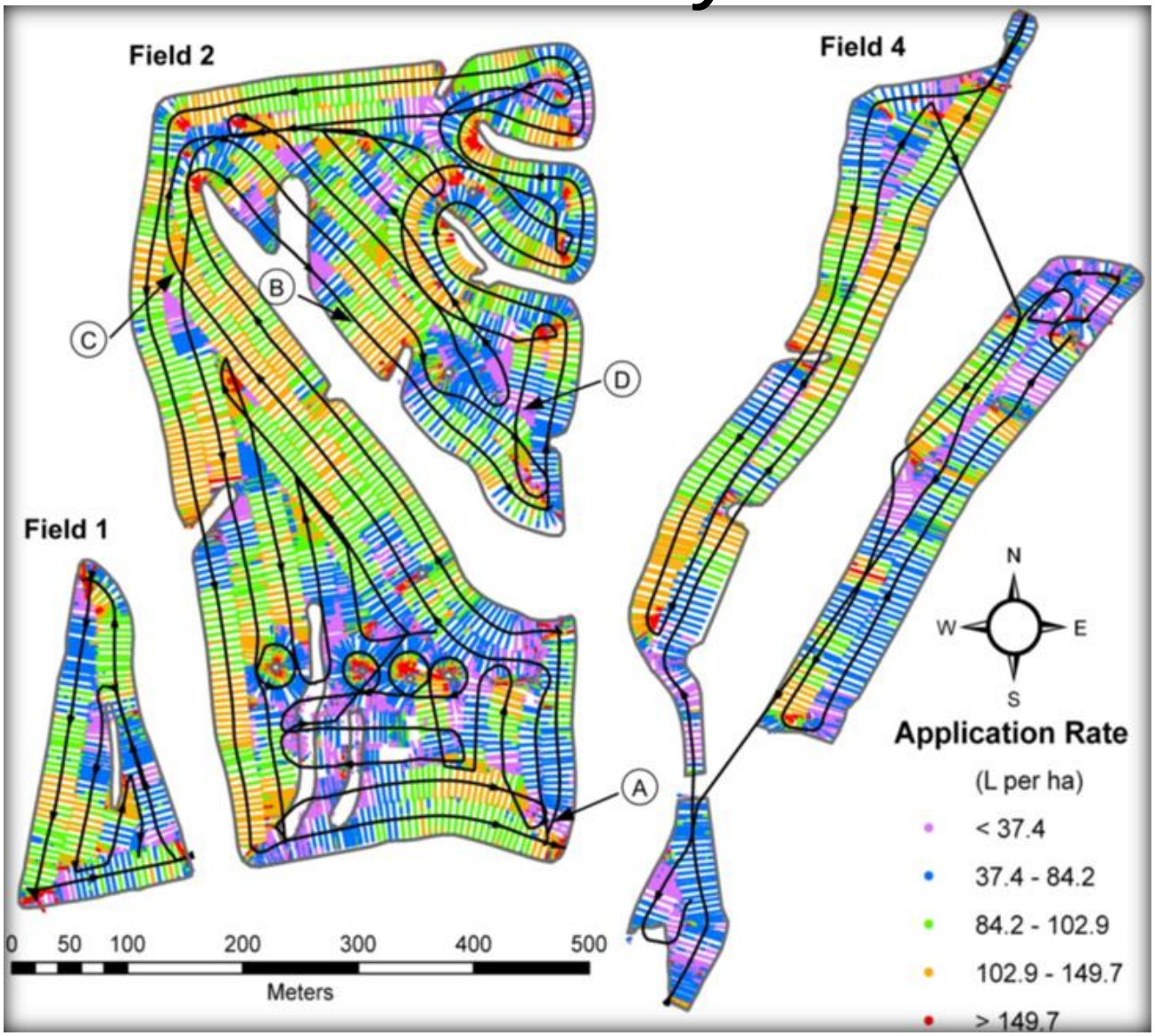
2015 Base: 261

Technology Advances are Enabling Data-Driven Agriculture

- Computer Processing
  - 1995: 100 MHz speed with Intel's Pentium chip
  - 2016: 3.5 GHz clock speed common
- Sensors: better and cheaper
- Cloud Storage
- Telematics, Data Transfer

Spray Application Accuracy

- Sprayer speed
- Turns
- Sections turning on and off



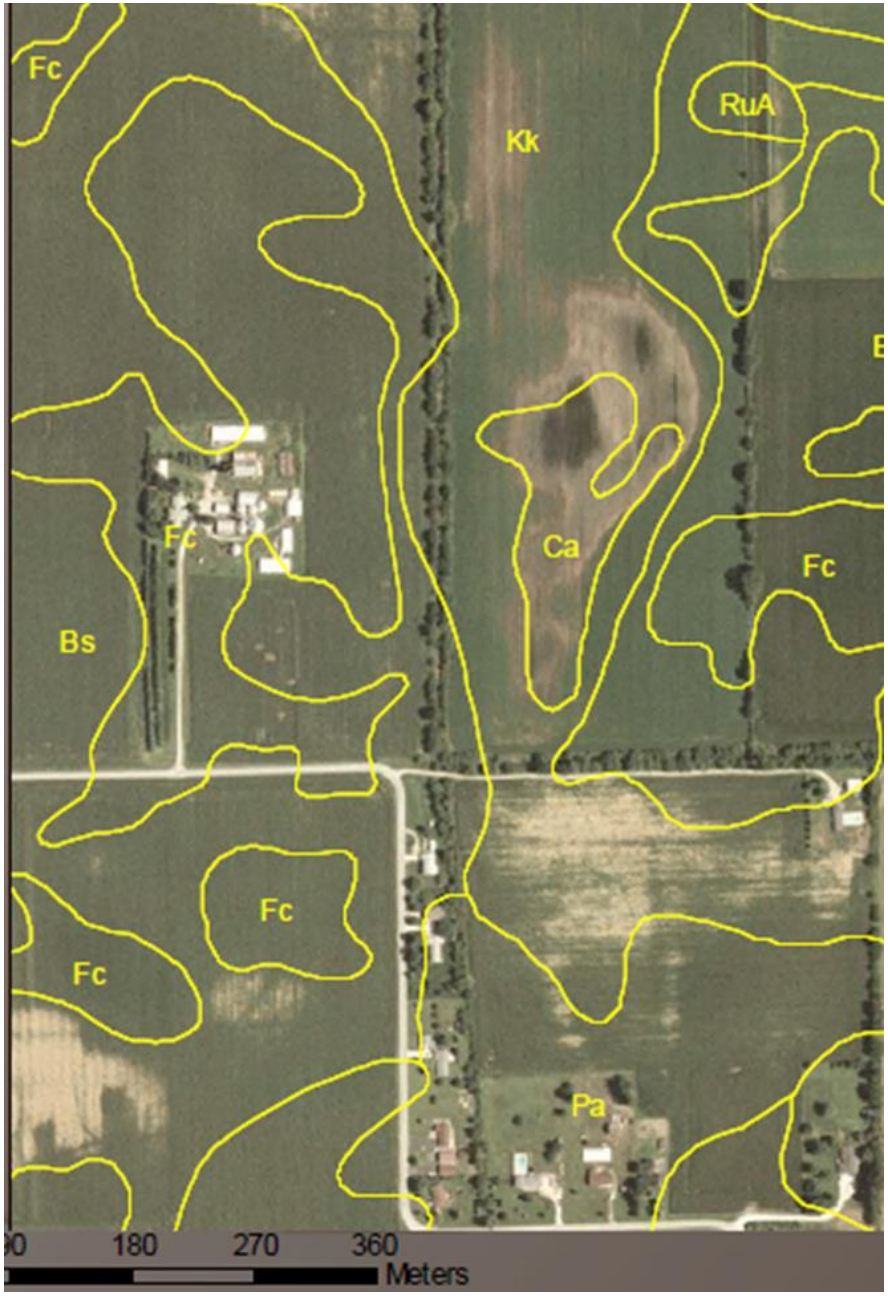
Tim Stombaugh, University of Kentucky

Technology Advances are Enabling Data-Driven Agriculture

- Functional soils maps
- Spatially dense soil sampling
- High resolution imagery

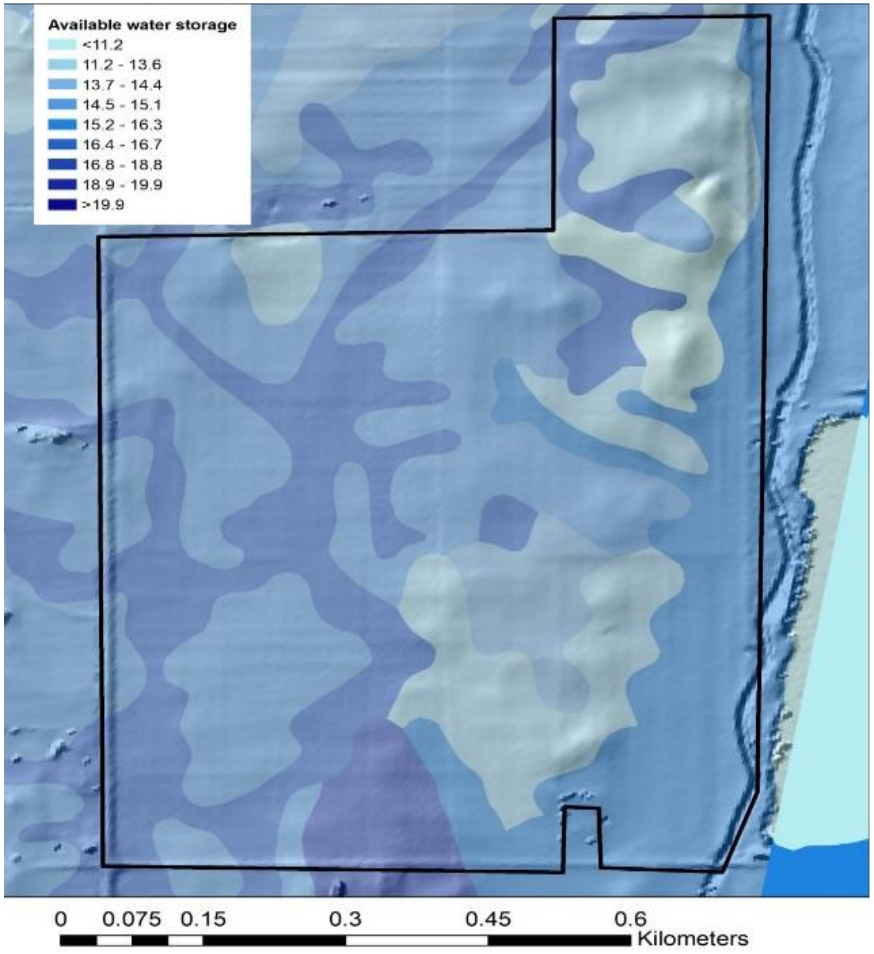
But technology exceeding our ability to interpret and understand

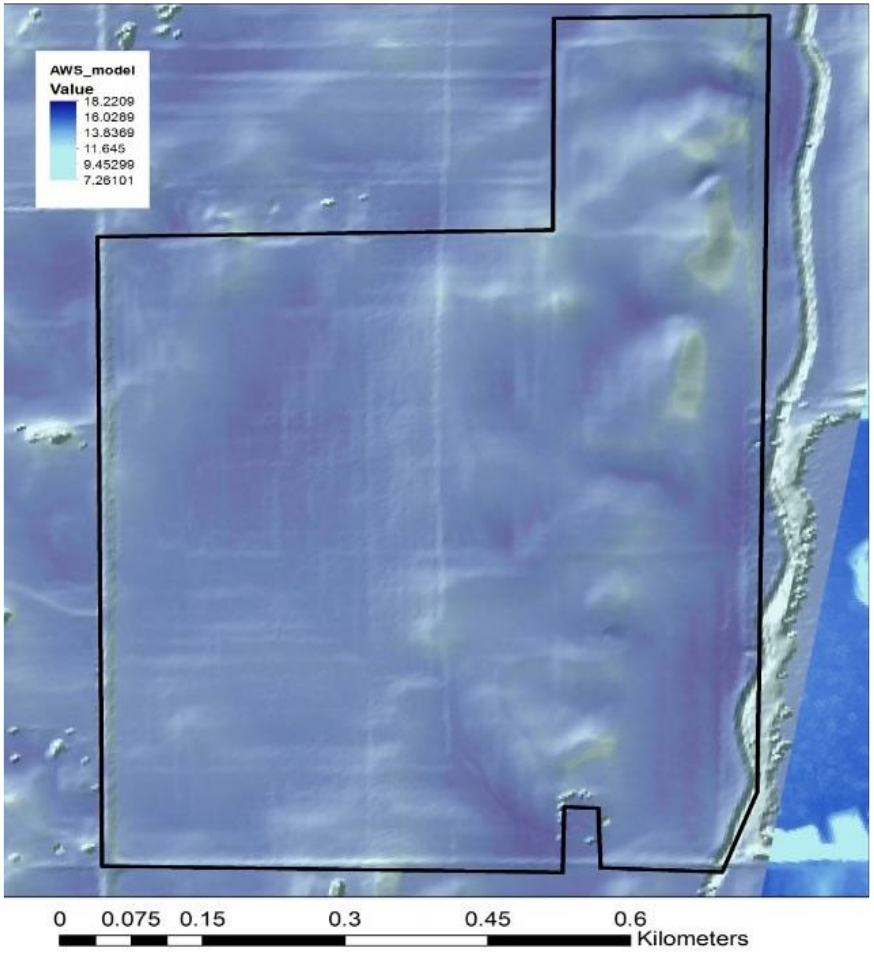
Acute need of soil and crop knowledge



NRCS Order 2 Soil Surveys Have Distinct Lines Representing Transitions and Can Have Inclusions up to 2 Acres

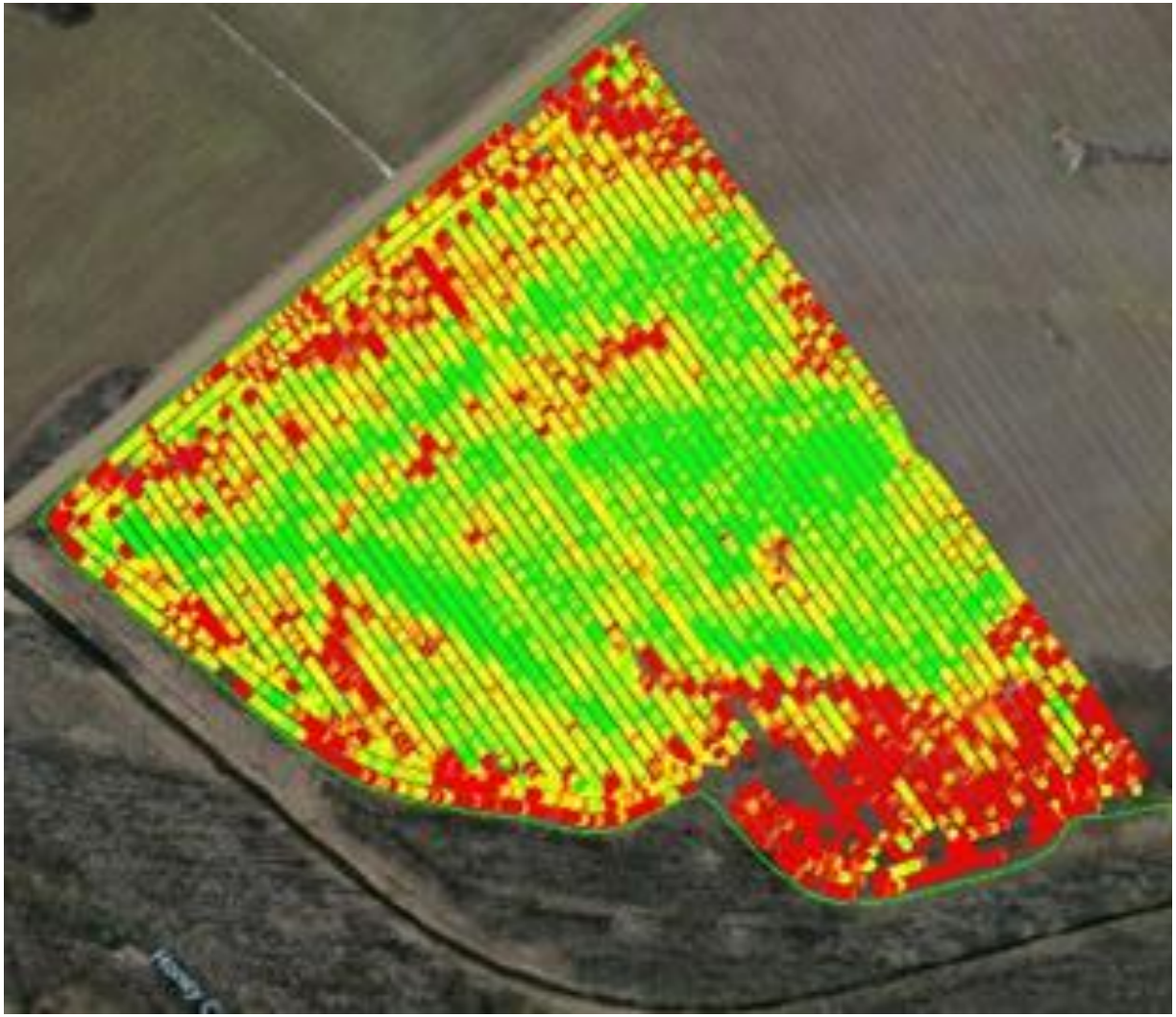
Functional Soils Maps





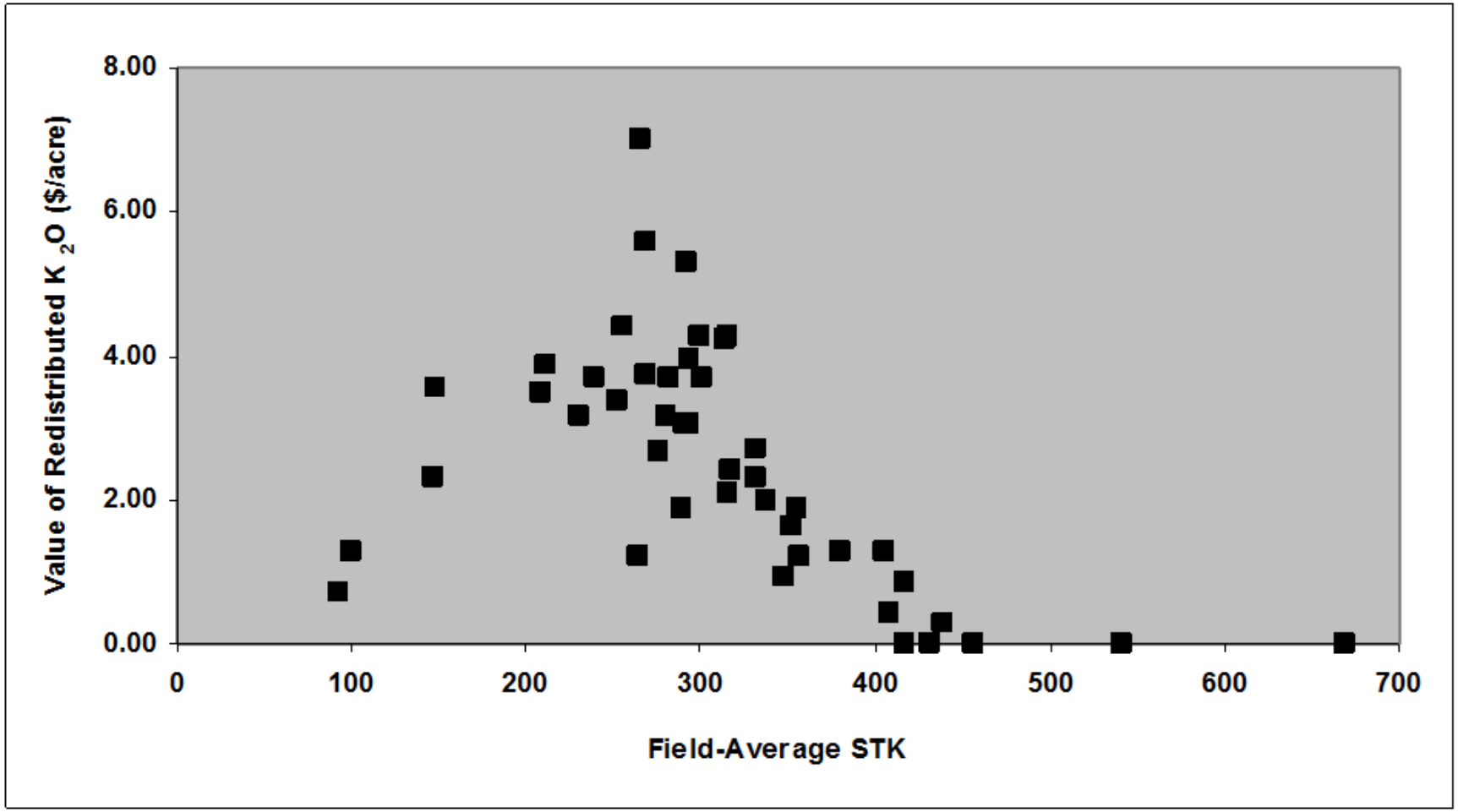
Phillip Owens, Purdue University

Enhancements to Yield Mapping



John Fulton, The Ohio State University

Value of Precision Nutrient Management Related to Average Level of Fertility



John Grove, University of Kentucky

Great Granddad Traded a Team of Horses for a Tractor in 1949

JD445-1-48

ORDER FOR

JOHN DEERE TRACTORS AND IMPLEMENTS

To Robinson's Farm Equip. Name of Seller — Rolfe Ia. Seller's Town and State — Date 6/21 1949

The undersigned orders from you for delivery on or about 6/21 1949 at Rolfe Ia., subject to the ability of the seller to obtain the goods from the manufacturer in time for delivery and prior to any price change by the manufacturer, the following described goods; viz:

Number Ordered	Size and Description of Goods	F.O.B. Factory Price Each	Freight	Purchaser's Handling Cost	Sales Tax or S.O.E.	Excise Tax (if any)	Total Price Each	Total
1	M T Tractor with cult.				36.54		1829 44	1865 98

For which I (we) agree to pay the Total Selling Price as follows; viz:

Allowance for articles taken in trade by the Seller: (Describe articles and show allowance price of each.)

One Team of Chestnut Small horses 7 + 8 yrs

Finance Charge	$	
Total Selling Price	$	1865 98
	$	
	$	#277.00
	$	
Total cash down-payment	$	
Total Down-Payment	$	277 00
Time Balance	$	1588 98

at 7 Percent per Annum from Maturity until

This Order, taken subject to acceptance by the Seller, is signed in Triplicate and together with the Conditions of Sale and Warranty and Agreement printed on the reverse side hereof constitutes the entire agreement between us. One copy of same being retained by the Purchaser(s), receipt of which is hereby acknowledged.

Rolfe Ia. Purchaser's P.O. Town State R.F.D. No. Signed Geo. L. Pirie Purchaser

Purchaser's P.O. Town State R.F.D. No. Signed Purchaser

Order Taken by

Accepted 6/21 1949

Robinson Farm Equip. Seller

By M. L. Robinson

Purchaser lives about

Miles N Miles E

Miles S Miles W from above P.O. Town in County.

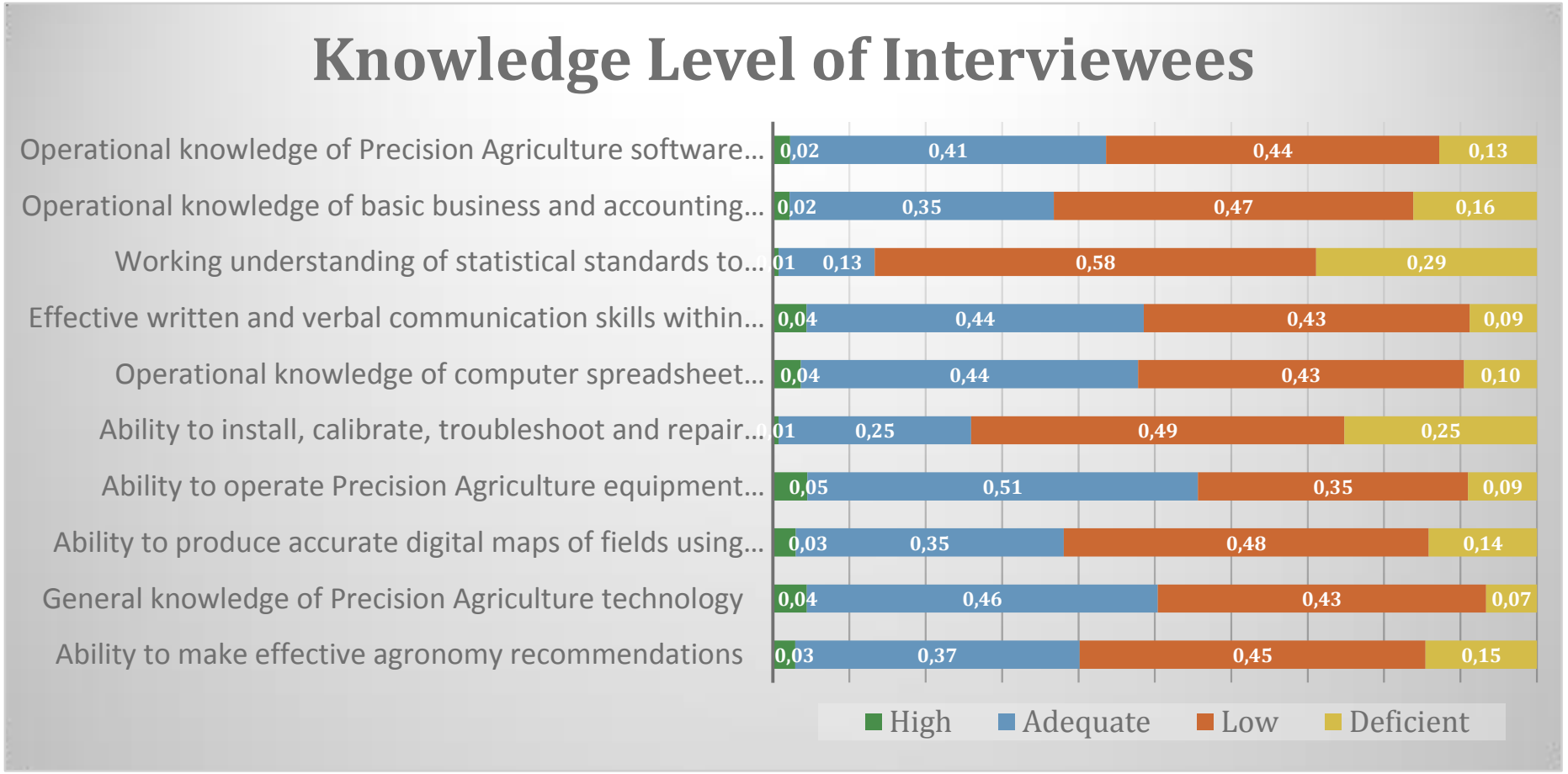
above

Benefits Realized Across a Range of Farm Sizes and Configurations

Sao Martinho Mill
Sao Paulo Province, Brazil
120,000 Hectares of Sugar Cane

120 Hectare Farm near Rotterdam, Holland

Informing the Precision Workforce



Precision Education Project, funded through USDA-AFRI Higher Ed award number 2014-70003-22369

PURDUE AGRICULTURE

Summary

- Automated precision farming technologies are standard equipment in dealerships and on commercial farms
- Great opportunity to expand data-driven management decisions
- Technology is increasingly in place—value will come by making changes based on new knowledge