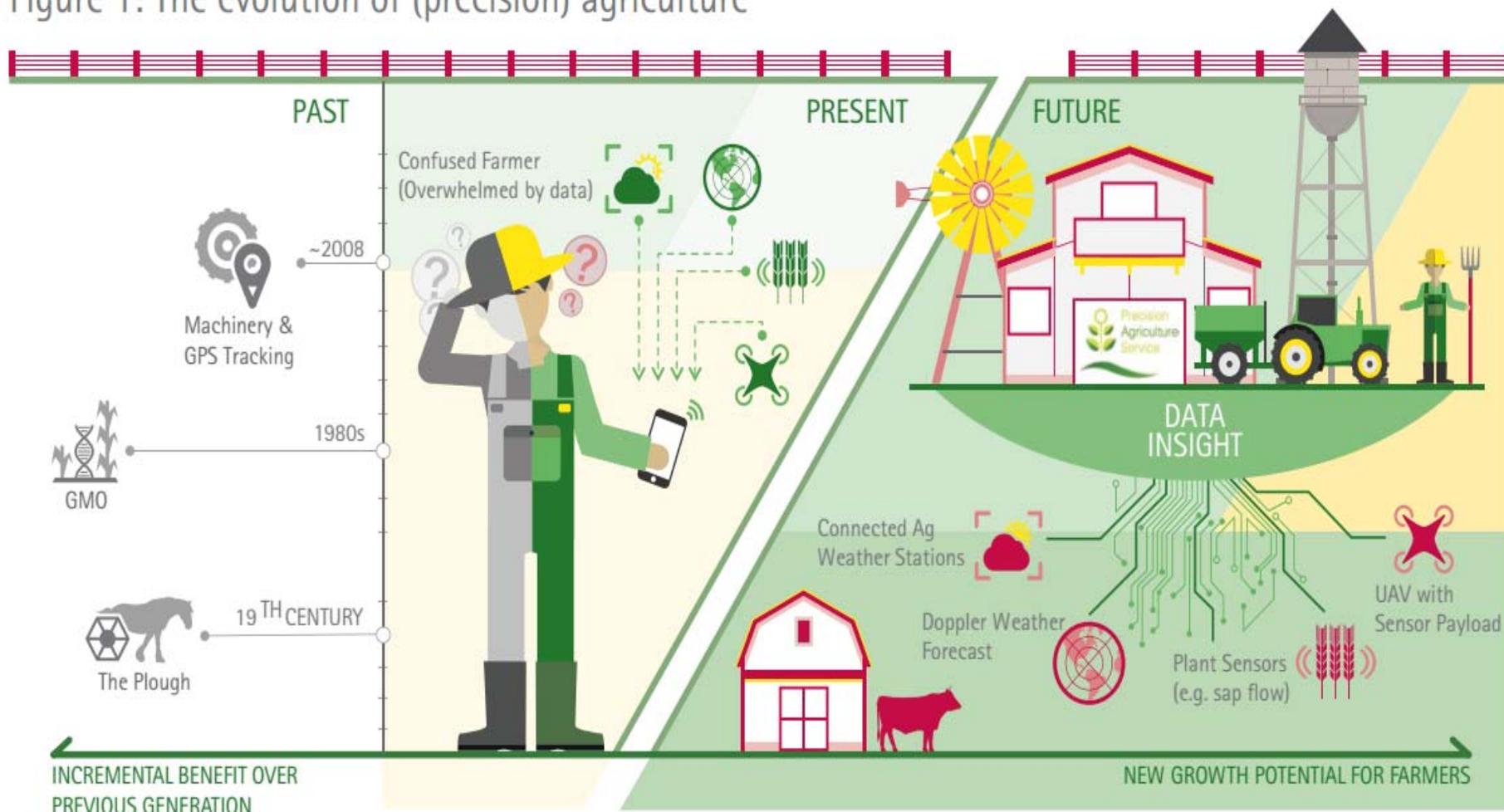


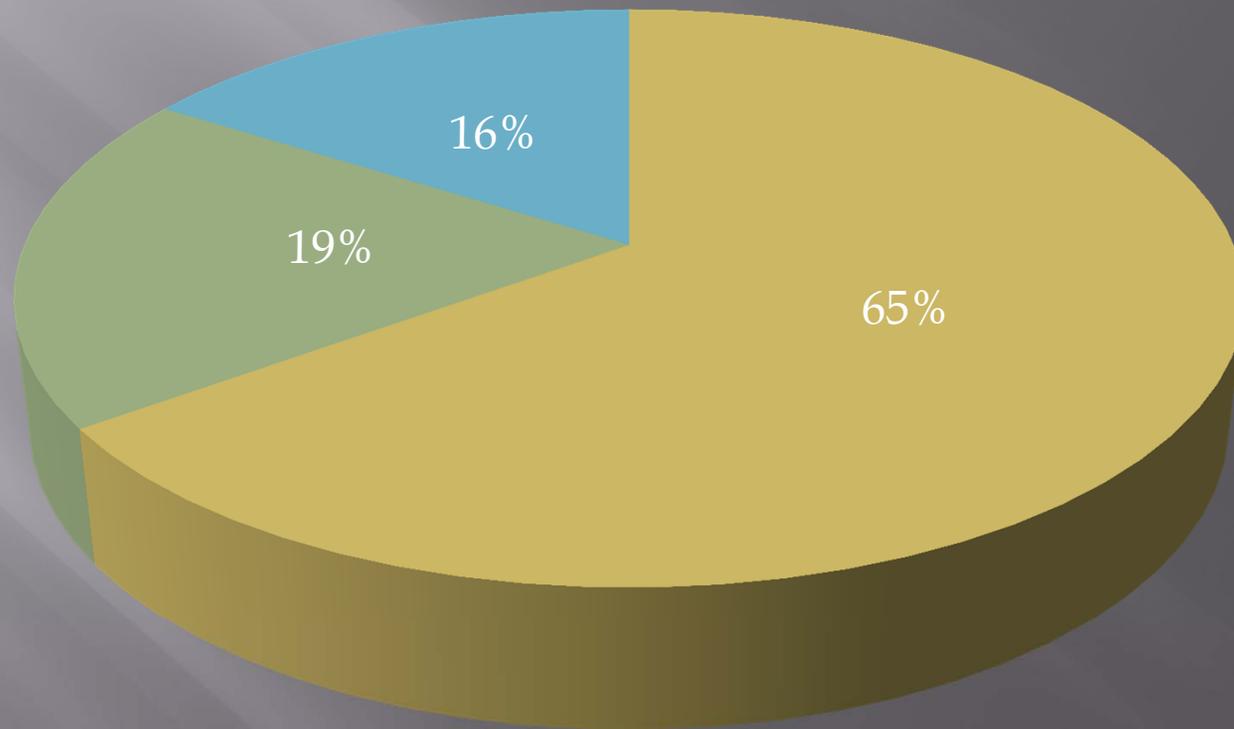
Figure 1: The evolution of (precision) agriculture



DON VILLWOCK - INDIANA

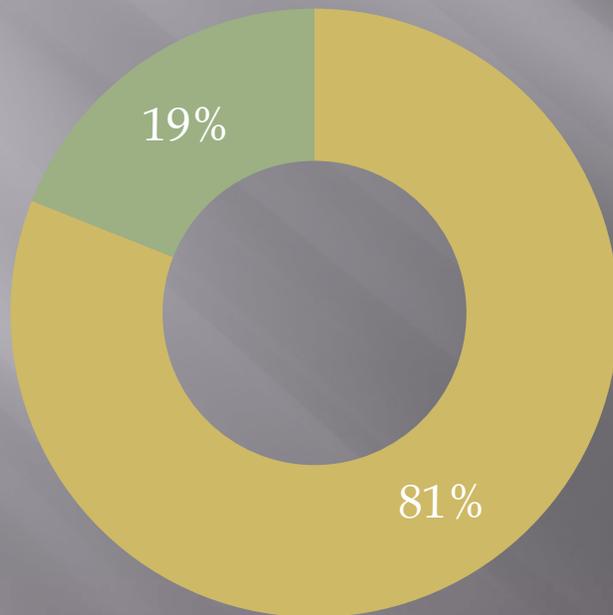
Farmers are excited, challenged,
pleased, confused, fearful and
intimidated.

How do you feel about the new technology?

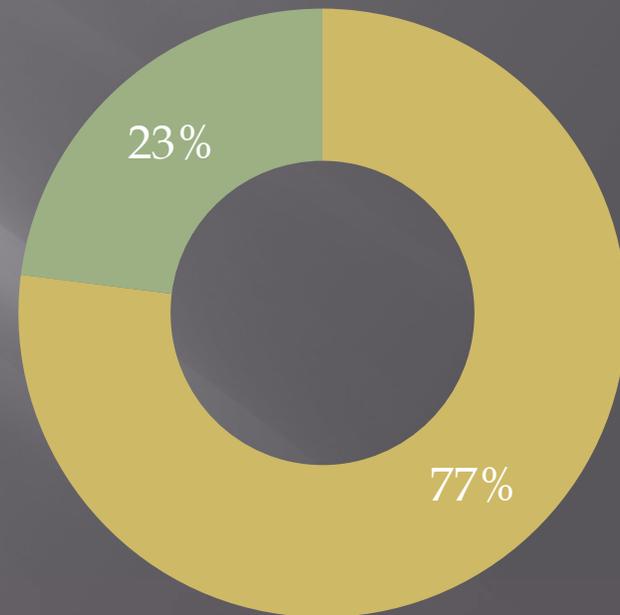


■ Skeptical/Fearful ■ Neutral ■ Embracing

81% think they own their data and 77% are worried about data security (September 2014 AFBF Survey)

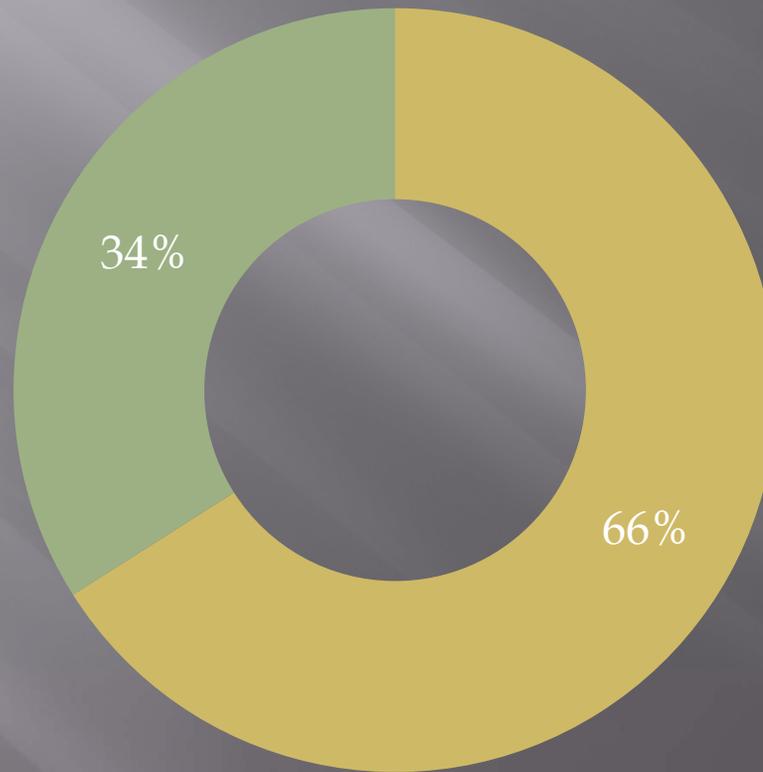


■ Yes ■ No



■ Yes ■ No

Do you intend to use data analysis? (September 2014 AFBF Survey)



■ Yes ■ Maybe Later

The benefits of Big Data for farmers are enormous

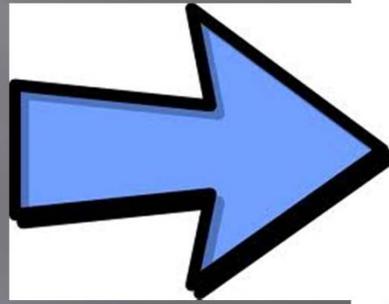
- ▣ Make more informed business decisions more quickly
- ▣ Improve Return on Investment
- ▣ Identify and reduce inefficiencies on the farm
- ▣ Improve crop yields, livestock and dairy production
- ▣ Reduce production costs
- ▣ Manage risk
- ▣ Improve marketing strategies
- ▣ Reduce fraud
- ▣ Meet regulatory compliance
- ▣ Improve sustainability
- ▣ Builds history for your fields over time
- ▣ Verify results of agronomic changes

But there are issues of concern – and a desire for farmers to have more information and more options

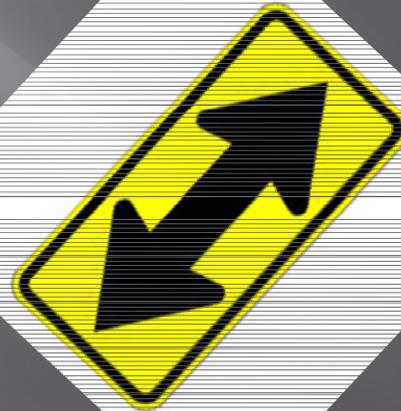
- ▣ Data ownership and control
- ▣ Data privacy and security
- ▣ Data availability
- ▣ Compatibility and interoperability of data
- ▣ Quality of data
- ▣ Data sharing
- ▣ Storage of data

Market manipulation?



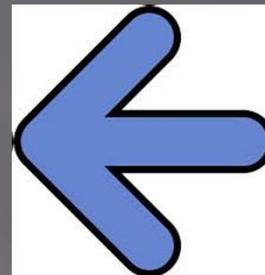
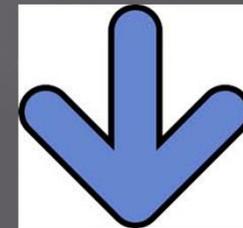


JOHN DEERE



DU PONT

 PIONEER



EPA RELEASES PRODUCER INFORMATION TO ANIMAL RIGHTS GROUPS



NCBA was notified by the EPA in February 2013 that the agency had been collecting information from states on CAFOs. The information was requested by extremist groups, including Earth Justice, the Pew Charitable Trust and the Natural Resources Defense Council through a Freedom of Information Act request and the was given to them.

The information released by EPA covers livestock operations in more than 30 states, including many family farmers who feed less than 1,000 head and are not subject to regulation under the Clean Water Act.

“My data is valuable – and I want to be paid for it.”

Only one company currently wants you to share in the potential profits.



Working Group of 13

(April 2014)

- ▣ Farm Bureau
- ▣ Farmers Union
- ▣ Soybeans
- ▣ Corn
- ▣ Wheat
- ▣ Cotton
- ▣ Rice
- ▣ John Deere
- ▣ Monsanto
- ▣ Beck's Hybrid Seed
- ▣ Raven
- ▣ Pioneer
- ▣ Dow

PRIVACY AND SECURITY PRINCIPLES FOR FARM DATA

(6-7 MONTHS -- NOVEMBER 2014)

.... the undersigned organizations and companies believe the following data principles should be adopted by each Agriculture Technology Provider (ATP).

....an ATP's principles, policies and practices be consistent with each company's contracts with farmers. The undersigned organizations are committed to ongoing engagement and dialogue regarding this rapidly developing technology.

35 Groups Signed 13 Principles

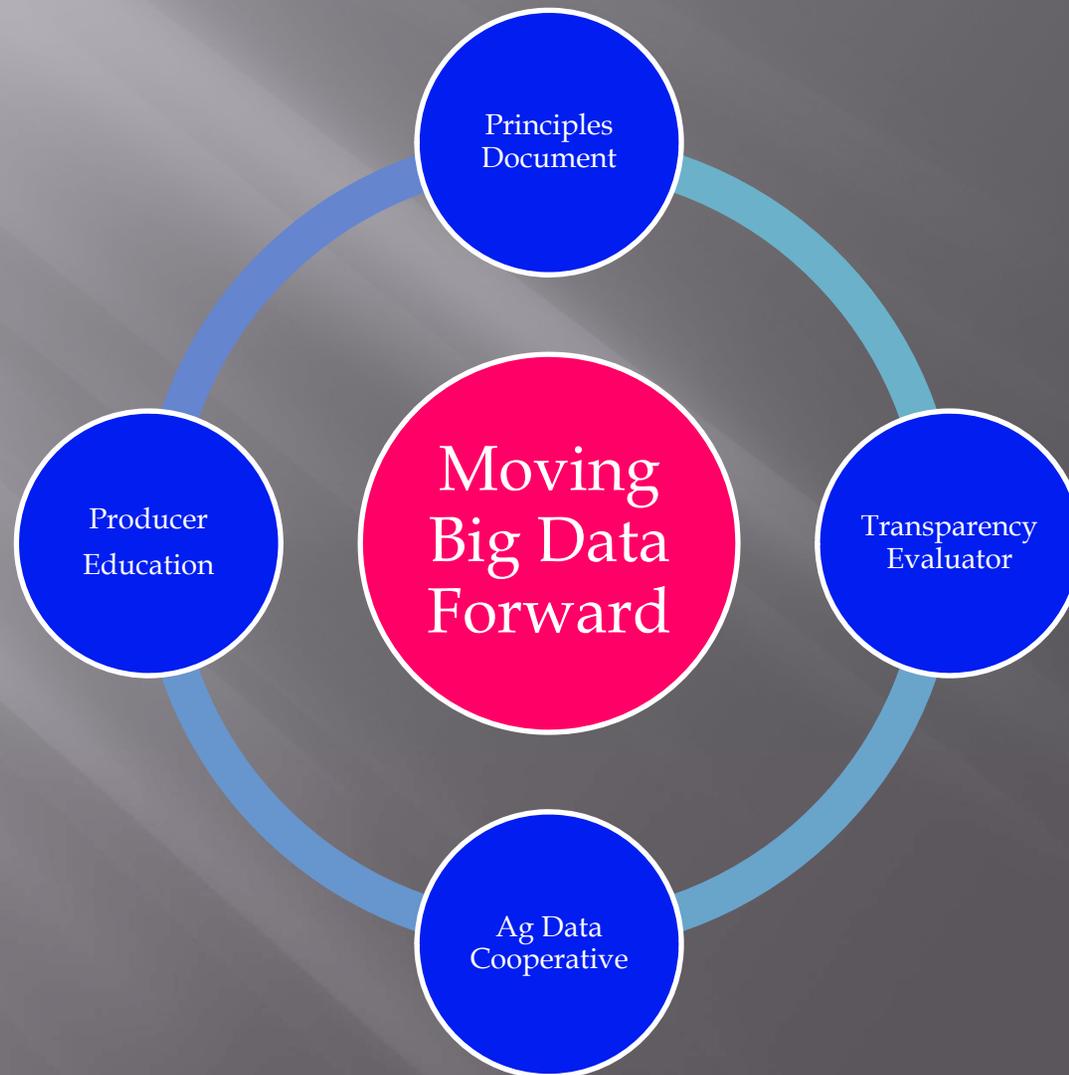
(February 2016)

- ▣ Education
- ▣ Ownership
- ▣ Collection, Access and Control
- ▣ Notice
- ▣ Transparency and Consistency
- ▣ Choice
- ▣ Portability
- ▣ Terms and Definitions
- ▣ Disclosure, Use and Sale Limitation
- ▣ Data Retention and Availability
- ▣ Contract Termination
- ▣ Unlawful or Anti-competitive Activities
- ▣ Liability and Security Safeguards

35 Supporting Groups

- ▣ AGCO
- ▣ Ag Connections, Inc.
- ▣ AgSense
- ▣ AgWorks
- ▣ Ag Leader Technology
- ▣ American Farm Bureau Federation
- ▣ American Soybean Association
- ▣ Beck's Hybrids
- ▣ CNH Industrial
- ▣ Crop IMS
- ▣ CropMetrics
- ▣ Dow AgroSciences LLC
- ▣ DuPont Pioneer
- ▣ Farmobile LLC
- ▣ Granular
- ▣ Grower Information Services Cooperative
- ▣ GROWMARK, Inc.
- ▣ Independent Data Management
- ▣ John Deere
- ▣ Mapshots, Inc.
- ▣ National Association of Wheat Growers
- ▣ National Barley Growers Association
- ▣ National Corn Growers Association
- ▣ National Cotton Council
- ▣ National Farmers Union
- ▣ National Sorghum Producers
- ▣ North American Equipment Dealers Association
- ▣ OnFarm
- ▣ Raven Industries
- ▣ Syngenta
- ▣ The Climate Corporation – a division of Monsanto
- ▣ USA Rice Federation
- ▣ Valley Irrigation
- ▣ ZedX Inc.

Farm Bureau finished the privacy and security principles and signed a “peace treaty” with the ATPs.



A TE will allow farmers to compare and contrast specific issues within contracts to see how the contract aligns with our agreed-upon principles.



- ▣ We found the one paragraph dealing with data privacy we were looking for buried on page 25 of a 38 page privacy agreement.
- ▣ It was 172 words out of nearly 17,000 in the agreement.



THE
AG DATA
TRANSPARENCY
EVALUATOR

*Bringing transparency to ag data
contracts.*

How do we solve
these problems?

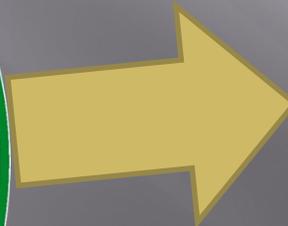
- ▣ Industry led effort to create standards: **Privacy and Security Principles for Farm Data.**
- ▣ **Signed by 35** farmer-led organizations and ag technology providers.

How do we solve these problems?

- ▣ Create a seal that promises adherence to the **Data Principles** and a commitment to **data transparency**.



The Ag Data Transparency Evaluator



<http://www.samplewebsite.com/agdata>



Precision Agriculture

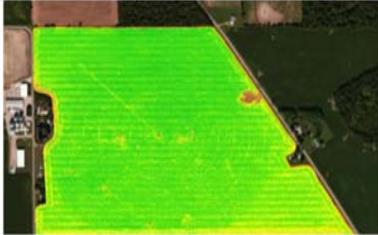
[Sample Website]



Services for Agricultural Technology Providers

"Precision agriculture" is a catch-all phrase that describes many technologies, but at its core precision ag means using new technology to increase production and efficiency on farms while reducing the environmental footprint. Precision agriculture brings many new legal challenges to agricultural technology providers. We have experience helping these cutting-edge technology companies draft clear, effective contracts. Think of us as the "link" between new precision ag technology and the farmer. Here are few services we offer:

- Drafting **privacy policies**
- Writing **terms and conditions**
- Drafting **End User License Agreements (EULAs)** and other software licenses
- Drafting **smart-phone app** user agreements
- **Copyright and trademark** registration
- Drafting **farm data** sharing or transfer agreements
- Negotiating **technology usage** and transfer agreements
- Assisting with **drone regulation** compliance
- Drafting **non-disclosure agreements (NDA)**



How does a company get the seal?

Answer 10 Questions.

- 10 Question evaluation form.
 - Data collection
 - Data privacy
 - Data control
 - Data portability
- First: Completed by ag tech providers.
- Second: Reviewed by Ag Data Transparent Administrator.

10 Question Transparency Evaluation Sample Data Product

Question	Answer	Explanation/Link
1 What types of information does the product collect from me?	Agronomic Data	Agronomic data is defined here [link to provision]
2 Can I terminate the contract at any time? (Understanding that payment obligation may remain)	Yes	Link to provision
3 Can I delete my data upon termination?	Yes	Link to provision
4 Does the product allow the ATP to share my data with third parties without my authorization?	Yes	Link to provision
5 Does the ATP pledge not to sell, trade or give my data to third parties without my consent?	Yes	Link to provision
6 Does the ATP confirm that marketing materials are consistent with contract governing use of the product?	Yes	Link to provision
7 Does the ATP attest to itself to provide notice to me if its privacy policies change?	Yes	Link to provision
8 Does the ATP define any third parties that may have access to my data?	Yes	Link to provision
9 Will the ATP notify me if a breach of data security occurs, causing disclosure of my data?	Yes	Link to provision
10 Does the ATP take appropriate security measures to safeguard my data?	Yes	Link to provision

10 Questions: A Closer Look

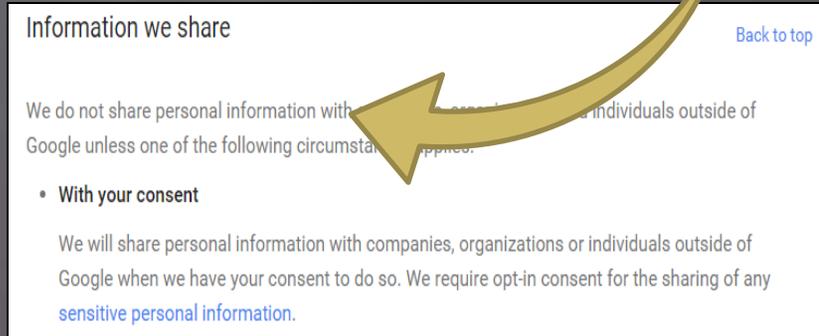
Question 1	Answer	Additional Information
What categories of data does the product collect from the farmer?	Agronomic Data Machine Data	Agronomic Data is defined as planting information, fertilizer applications, and yield data. Machine Data is defined as engine speed, load, fuel usage, and miles traveled. These are defined in the Terms and Conditions.

ownership, control, portability, and termination.

10 Questions: A Closer Look

Question 4	Answer	Additional Information
Will the ag technology provider obtain my consent before providing other companies with access to my data?	Yes	In our Privacy Policy , we inform you that we will never sell or share your data without your consent.

- Farmers can click on [links](#) to view the actual policies.



Information we share [Back to top](#)

We do not share personal information with companies, organizations or individuals outside of Google unless one of the following circumstances applies:

- **With your consent**

We will share personal information with companies, organizations or individuals outside of Google when we have your consent to do so. We require opt-in consent for the sharing of any [sensitive personal information](#).

Research Tool: Ag Data Transparent Website

- Allows farmers to search for products.
- Easy comparison.
- Lots of information.

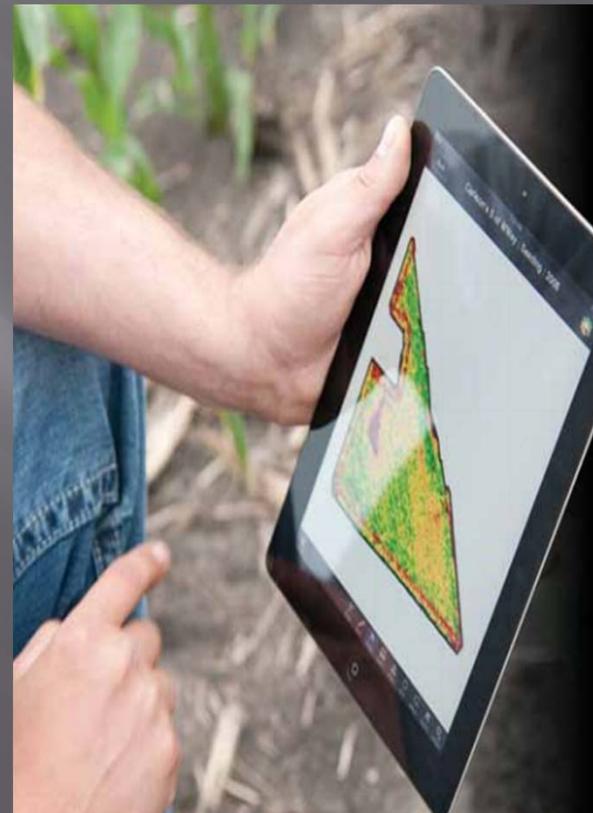
The screenshot displays the 'Ag Data Transparency Evaluator' website. At the top, there's a navigation bar with the 'The Voice of Agriculture' logo and social media icons. Below the navigation bar, there are several news snippets. The main content area features a search bar and a list of questions related to data ownership and sharing. The questions are:

- When categories of data "does the product or service collect from me?"
- Do I retain ownership of my data after I transfer my data to the ATP?
- Does the ATP allow data sharing or transfer to any person or company that are not a party to my agreement with the ATP?
- After I upload data to the ATP will it be possible to retrieve my original complete dataset in a commonly used format?
- In some instances, data uploaded is converted into the ATP's proprietary format, but the raw data uploaded may still be retrieved, subject to data retention policy found in the Terms and Conditions.
- Can I stop uploading data at any time (with the understanding that other contract obligations may remain until the contract term ends)?
- Can my original data be deleted upon termination?

The answers to these questions are provided in a table format, with links to 'more info' for each question. To the right of the questions, there are sections for 'In This Section', 'Related Resources', and 'Partners'. The 'Partners' section lists various agricultural organizations and companies, including Pioneer, The Climate Corporation, John Deere, ASA, CNH Industrial, Granular, and Monsanto. At the bottom of the page, there is a footer with a list of 'latest topics', 'programs', 'events', 'videos', 'shop', 'take action', 'press room', 'contact', and 'legal'. There are also social media links for Twitter and Facebook, and a copyright notice for 2015 American Farm Bureau Federation.

Why use the Evaluator?

- ▣ **Trustworthy:**
Backed by farmer led organizations and the industry
- ▣ **Quick:** Seal of Approval
- ▣ **Simple:** 10 questions
- ▣ **Free**



Will the Industry Participate? Yes.

- ▣ Designed for startups and legacy companies
- ▣ Product specific, not corporate-wide mandates
- ▣ Focus on “**transparency**”



23 Startup Participants

FARMER-LED ORGANIZATIONS

- American Farm Bureau Federation
- American Soybean Association
- National Corn Growers Association
- National Farmers Union
- National Sorghum Producers
- National Association of Wheat Growers

AG TECHNOLOGY PROVIDERS

- | | |
|---|---|
| <ul style="list-style-type: none">▪ AgConnections▪ AGCO▪ Agrible, Inc.▪ Conservis▪ Climate Corporation - Monsanto▪ Beck's Superior Hybrids▪ CNH Industrial▪ Crop IMS▪ Dow Agrosiences | <ul style="list-style-type: none">▪ DuPont Pioneer▪ Farmobile▪ Farm Dog▪ Grower Information Services Cooperative▪ Growmark Inc.▪ Granular▪ John Deere▪ Independent Data Management LLC |
|---|---|

- **Manage Our Everyday Business Needs:** such as payment processing and financial account management, product development, product safety, contract management, website administration, web-forum management, order or contract fulfillment, analytics, fraud prevention, corporate governance, reporting and legal compliance.

4. Why Information & Data are Disclosed by John Deere

John Deere understands that you may not want us to provide Personal Information and Machine Data to third parties for their own marketing purposes. We limit our sharing of Personal Information and Machine Data as follows:

- We may share Personal Information and Machine Data with our affiliated companies, suppliers, authorized John Deere dealers and distributors, and business partners, which may use it for the Purposes listed above.
- We may also share Personal Information and Machine Data with our service providers to fulfill the Purposes on our behalf. Our service providers are bound by law or contract to protect the information and data, and to only use it in accordance with our instructions.
- We may disclose Personal Information and Machine Data where needed to affect the sale or transfer of business assets, to enforce our rights, protect our property, or protect the rights, property or safety of others, or as needed to support external auditing, compliance and corporate governance functions. We will also disclose Personal Information and Machine Data when required to do so by law, such as in response to a subpoena, including to law enforcement agencies and courts in the United States and other countries where we operate.

Please note that we may also disclose information and data about you that is not personally identifiable. For example, we may publish reports that contain aggregated and statistical data about our customers and equipment. These reports do not contain information that would enable the recipient to contact, locate or identify you.

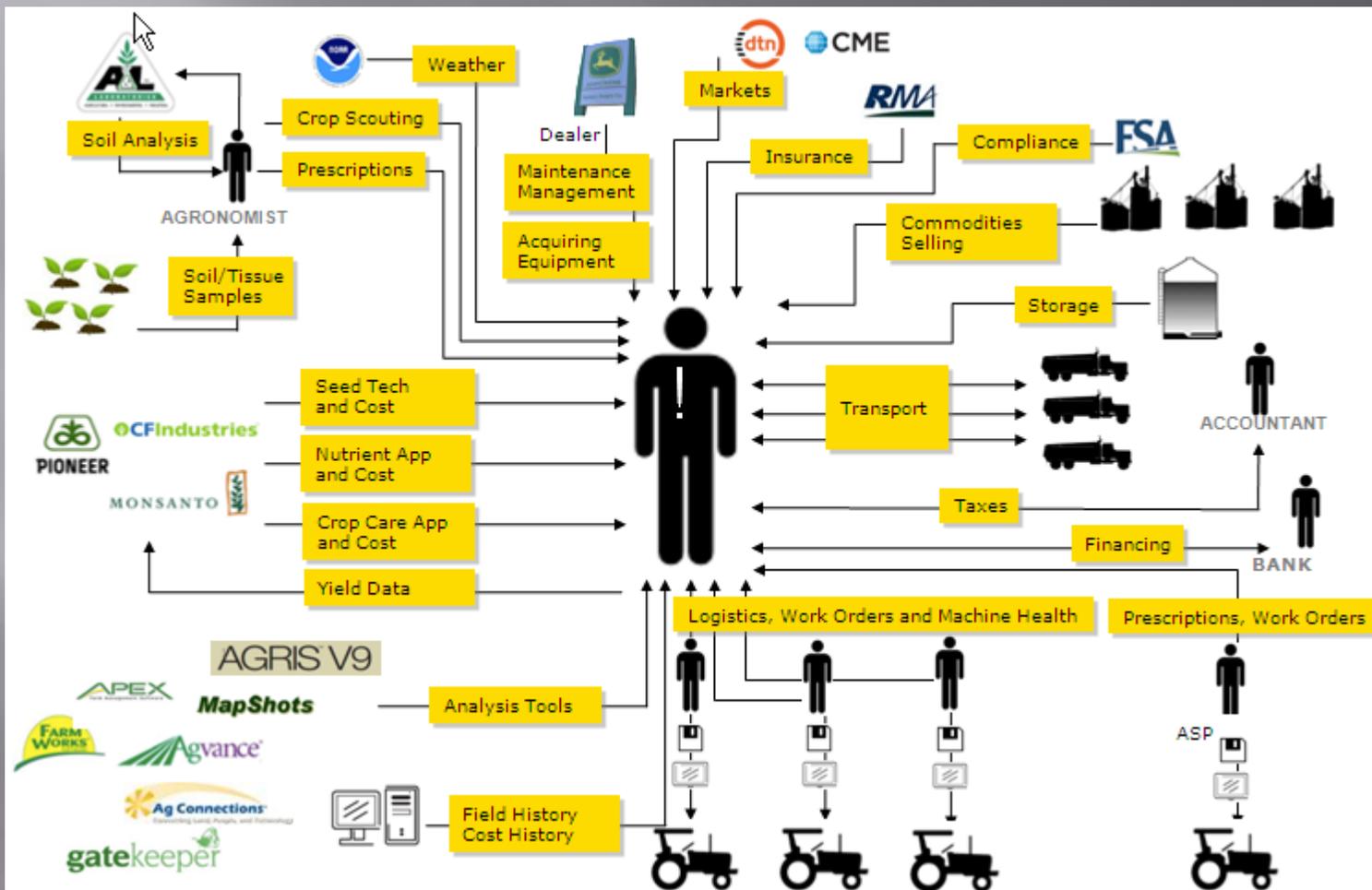
5. Cookies and Similar Collection Technologies

Education is challenging - numerous audiences within agriculture (and maybe mostly generational)

- ❑ Comfortable with technology, but not with usage, privacy, transparency issues
- ❑ Uncomfortable with technology (103 beta tests and only 20 downloaded and 20 more hired someone)
- ❑ Nonbelievers- “have more in their head about their farming operation than data could possibly provide” – Outlaw – “what’s a browser”?

Everyone agrees we need to educate farmers about the technology, BUT....

- ▣ In a generic way, ATPs want to educate farmers to “remove the fear so they will use the technology more”.
- ▣ Farm groups want to make sure farmers understand the issues so they can make the decision that is best for them.
- ▣ From a “working group” perspective, this may be our biggest failure---



Tyler McClendon – Arkansas (background using statistical models in investment banking)

- ▣ “Data was neither accurate nor complete. Data was in formats and structures that were practically unusable. Proprietary formats made it so I couldn’t transfer data from its source system to a place where I could use it. The data structures made it so I couldn’t make apples-to-apples comparisons.”

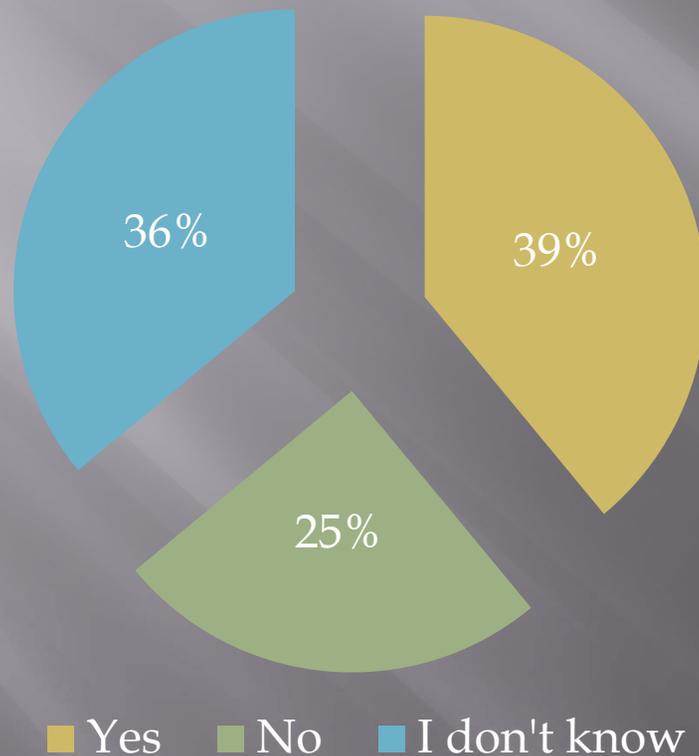


Steve Pitstick - Illinois



- ▣ Being part of an agricultural organization that's not tied to any company and is fully independent is huge for me.

Is your data portable between equipment manufacturers or seed dealers?



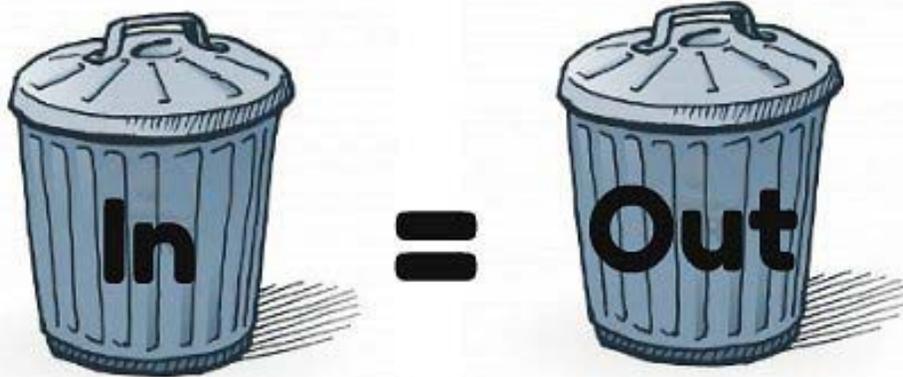
The data repository

- ❑ Farmers can retrieve their farm-level data for storage or use in other systems;
- ❑ The repository will not sell and/or disclose non-aggregated farm data to a third party without first securing approval of the farmer;
- ❑ Farmer data can be removed, securely destructed and returned if the farmer so requests;
- ❑ A farmer will be able to discontinue the service or halt the collection of data at any time subject to appropriate ongoing obligations. Procedures for termination of services will be clearly defined in the contract; and
- ❑ The data will not be used for unlawful or anti-competitive activities, such as a prohibition on the use of farm data to speculate in commodity markets.

A data repository

- ▣ Farmers maintain ownership and control of their data and have unrestricted access to their data;
- ▣ Farmers are notified about the purposes for which the repository will collect and use farm data;
- ▣ Farmers will be provided contact information for the repository in case of inquiries or complaints;
- ▣ The repository's principles, policies and practices will be transparent and fully consistent with the terms and conditions in their legal contracts;
- ▣ Farmers will determine who, if anyone, gets access to which portion of their data;
- ▣ Data will be exportable if a farmer so chooses. Farmers will have the freedom to move their data between input suppliers and retailers or analytics services ;
- ▣ Data security is a priority;
- ▣ The repository will allow farmers to capture data from a variety of devices and sources;
- ▣ The repository is structured so that it is not subject to the Freedom of Information Act;

Do farmers have usable and accurate data? If you don't clean it, it will likely lead to poor decisions this year AND in the future.



- ▣ Raw yield map data needs to be cleaned. 30-75% has errors.
- ▣ is the GPS wobbly?
- ▣ overlaps?
- ▣ missing data?
- ▣ are high and low yields removed?
- ▣ have the combine speed changes been minimized?

“My data is valuable – and I want to be paid for it.





JOHN DEERE

MONSANTO



PIONEER[®]
A DUPONT COMPANY

John Deere has said precision services and its "intelligent solutions group" would be a major piece of **doubling its size from a \$25 billion company in 2010 to a \$50 billion company by 2018.**

Monsanto underscored its devotion to farm data analytics when it bought weather data-mining company the Climate Corporation in October, describing it as its **"entry ticket into a \$20 billion market opportunity."**

DuPont Co. anticipates **generating as much as \$500 million a year in revenue from high-tech farm data services** over the coming decade, a senior official said Thursday.

AFBF/Measure Study

- ▣ July 2015
- ▣ Determine value of drones to ag
- ▣ Corn, wheat, beans will benefit from field crop scouting and 3D maps
- ▣ Crop insurance for fraud and abuse

Drone service to enhance crop scouting

- ▣ \$12/acre for corn
- ▣ \$2.60/acre for soybeans
- ▣ \$2.30/acre for wheat
- ▣ ROI calculator for:
 - Crop scouting
 - 3D mapping
 - 3 crops – corn, beans, wheat

- Big Data is here to stay and WILL change the way farmers “farm”
- Most farmers have always thought what they did was private. With technology changes, including drones, it is a paradigm shift.
- Very likely to lead to more rapid consolidation in agriculture

