

Data Fundamentals

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GOAL After reading our section, the grower should have a basic understanding of how on-farm data can be used to generate value and understand types of data, data usage complications and basic data management considerations.

VALUE STATEMENT By understanding the fundamentals of on-farm data, the grower may improve efficiencies, enhance input allocation, improve on-farm practices and inform new decisions or insights. In addition, they will be able to understand how data is being generated on their farm, how data flows to and from third party constituents and how data compatibility affects their operation.

AG Data 101

Precision agriculture enables farmers to collect not only field-based information, but site-specific data enabled by the Global Positioning System (GPS). Data allows farmers to – within their operation – create information and support on-farm decisions. As time and technology have evolved, connectivity and cloud technology have provided portability and access to data by farmers and their trusted advisors.

On the farm, technology adoption has increased significantly over the last decade. Many producers have turned to technology as a means to become more efficient, reduce workload and for storage/analysis of production

data. All levels of technology adoption exist across the realm of agriculture, and adoption level is usually determined by farm size, technological expertise and amount of investable capital.

In most cases, data usage is implemented with the goal of making some type of informed agronomic and farm business decision. This process usually starts with the collection of data, then some form of data visualization or analytics that provide either previously unknown information or recommendation (3rd party), then the producer is able to make an informed decision.

Data Value

Data usage in agriculture has been proven to hold value. There are many applications where data – and the decisions made from that data – can directly benefit the producer's bottom line. This value stems from large collections of farm data that are being used by farmers, companies and government agencies to aid in decision making related to crop production and management practices, as well as better predictions around nutrient and water availability. It is important to understand what value all of this farm data provides to the producer.

Data Types

Data collected for use in agricultural settings can come from a variety of sources and be used for multiple applications. Some of the types of data currently used in commercial agriculture are displayed below.

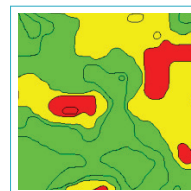
Figure 1. Agricultural data types.



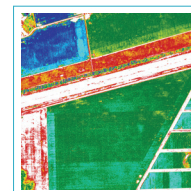
AGRONOMIC



MACHINE



PRESCRIPTION



REMOTE-SENSED



PRODUCTION

Data Hurdles

DATA COMPATIBILITY

Interoperability is the ability of a system or product to work with other systems or products without special efforts of the user. An example includes connecting a data stream between a Brand “A” tractor with a Brand “B” planter, and this is far from being the only situation that demonstrates this particular issue. Another consideration is portability – the capacity to move, copy or transfer data easily between environments securely without affecting usability of the data.

DATA FORMATS

Proprietary formats, (such as .dat, .gsd, .rbin. or .agdata) for storing data and for data exchange between field machinery and farm management software can add an additional hurdle to on-farm data usage. Some open source file formats such as .txt, .shp, and .xml are available and can facilitate easier implementation of data on the farm. This wide range of data formats that are commonly used, but not necessarily interchangeable, may make it challenging to analyze data in a single space. Make sure to evaluate various digital tools and services for their ability to interpret and visualize these file formats.

Data Implementation

Data often follows a common flow. Of course, data is first collected, often with some type of technology. The producer will then upload this farm-level and personal data. While some producers may choose to manage their own data, it is more common that an Agricultural Technology Provider (ATP) will aggregate the farmer’s data, combine it with other relevant data sets, and apply algorithms to analyze and visualize it. The ATP then gives the farmer a customized solution or recommendation based on data received. Using the recommendations provided by the ATP, the farmer can then use actionable information to make on-farm decisions.

DATA FILE COMPONENTS

Site-specific data files are often comprised of many geo-referenced points that contain various attributes related to the field operation or site-specific characteristics of the field. One important concept to grasp is that these collected data points often have more information than is visualized by a single map. Attributes for each of these points that are commonly collected are shown in Figure 2. Certain farm management software can be used to maximize the value of data usage.

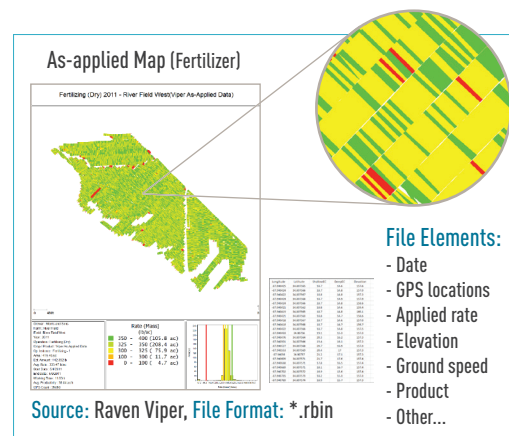


Figure 2. Understanding that an ag data file represents many site-specific attributes is an important part of data fundamentals.

DATA STORAGE

Storing data is a critical part of using data effectively. Data should be archived in both an on-farm and off-farm storage location (i.e., on the cloud) to ensure that there is a backup that can be accessed in any scenario. Data should be organized in a way that considers long-term data stewardship. At the very least, data should be organized by year, and then by crop, field or farm as appropriate for the operation.

Resources

Ohio State Precision Ag – Big Data Webpage
<https://fabe.osu.edu/programs/precisionag/bigdata>

Alabama Cooperative Extension System – Data Management at the Farm Level <http://www.aces.edu/pubs/docs/A/ANR-2057/ANR-2057.pdf>

Precision Farming Dealer – Does Your Co-Op Own Your Farm Data?
<https://www.precisionfarmingdealer.com/blogs/1-from-the-virtual-terminal/post/1417-does-your-co-op-own-your-farm-data>

Ohio State Fact Sheet – The Data Ownership Confusion
<https://ohioline.osu.edu/factsheet/fabe-55201>

American Farm Bureau Federation – Ag Data Transparency Evaluator <https://www.agdatatransparent.com/>

AgGateway – Agriculture Glossary
<https://aggateway.atlassian.net/wiki/spaces/G/overview>

For more information and links to additional resources, visit www.unitedsoybean.org/techtoolshed

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