MapShots

Intelligence Visualized for Efficient Crop Management

Automated Data Capture

2015 AgStudio Vendor Showcase

July 28, 2015

MapShots Product Family

- *AgStudio desktop solutions*
- *AgStudio Select web solutions*
- *AgStudio MAP mobile applications*
- *AgDirector Service corporate integration*

AgStudio

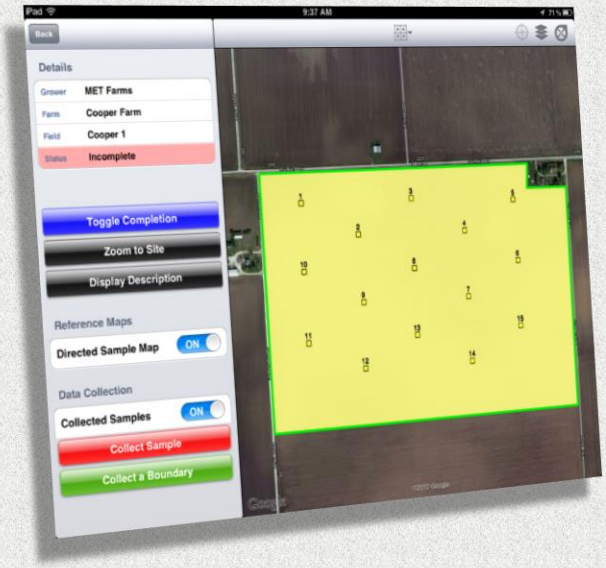
- *Desktop Windows application*
- *Cloud-based data access*
- *AgStudio PRO*
  - *Features for the service professional*
  - *Three levels of organization above the grower*
  - *User access can be limited by domain and function*
  - *Private database*
- *AgStudio FARM*
  - *Multiple Boundary Sets – Lease and USDA Management*
  - *Features for the single farming operation*
  - *Data comingled into a common grower database*
  - *Access to grower-specific business features*

AgStudio Select

- *Web-Based application extension to AgStudio*
- *Optimized for tablet devices*
- *Optimized for use in the field*
- *Can be used in the office on desktop machines*
- *Heavy lifting is done on the desktop, but production is done via Select*
- *Simpler interface than the full-featured AgStudio desktop application*

AgStudio MAP

- *Wireless sync with AgStudio database*
- *Disconnected operations and cached background imagery*
- *Use previously created directed sampling layers or apply a grid on the fly*
- *Dedicated to boundary mapping and soil sampling*
- *GPS Offsets*



AgDirector Service

- *Originally built to convert Field Device Logs into FieldOps data common object model*
- *Original function has become Card Manager Processor*
- ***Full service can now manage many workflows beyond simple Field Device Log data conversions***
- *Licensing available for just Card Manager Processor or the full AgDirector Service, with optional add-on processors*

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The Last Year in Review

Internal Learnings

- *New customers bring new revelations*
  - *Our customer base had grown and learned with us.*
  - *We underestimated training and support requirements for new users*
- *We had grown complacent with happy-path processes*
  - *Learning that people won't create cropping plans*
  - *Learning that people can't setup their monitors correctly*
- *Product performance not satisfactory for large amounts of editing*
- *Our internal QA processes were not satisfactory*

Internal Adjustments

- *Added additional support staff*
- *Dedicated development resources to support*
  - *Immediate diagnostics*
  - *Greater awareness of opportunities for improved UI and processes*
- *Added a new QA director*
- *Significant performance profiling*

External Learnings

- *Field devices have virtually no data validation*
  - *You can harvest w/o picking a commodity*
  - *You can harvest "Corn" crop w/o indicating that the commodity is "Corn Grain" or "Corn Silage"*
  - *You can change products in a monitor w/o clearing out the original product*
  - *You can enter dry units on liquid products*
- *Growers won't separate tasks*
- *Product mixes are a disaster*
- *WDT Files can be modified and resent? Seriously????*
- *APIs that generate useless documentation*
- *Stupid data sharing interfaces*

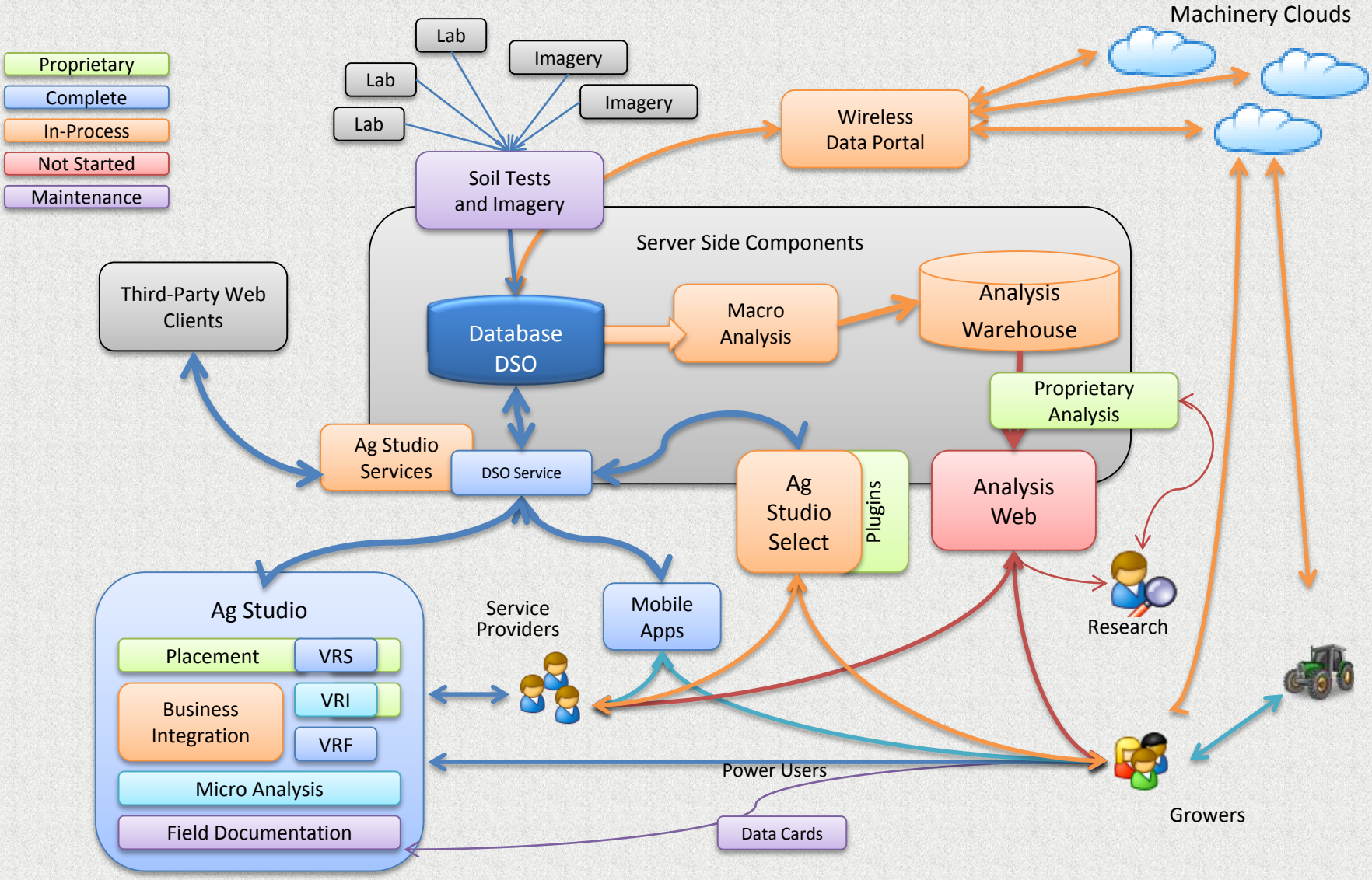
Bright Spots

- *FODM and the FODDs are now replaced*
- *Support for guidance patterns*
- *Excellent Raven/Slingshot support*
- *New Trimble support*
- *New XRef engine*
- *VRA Export can be generated for multiple devices and multiple send-to locations from a single export*
- *Rx, Formulation, and VRA export through Select*
- *15 new reports, many related to application and business summaries*
- *Full support for product mixes*
- *Batch support for MYYA*
- *Introduction of an internally built MAP application*
- *DriftWatch integration*
- *Huge improvement in resource linker performance*
- *Three new utility extensions*

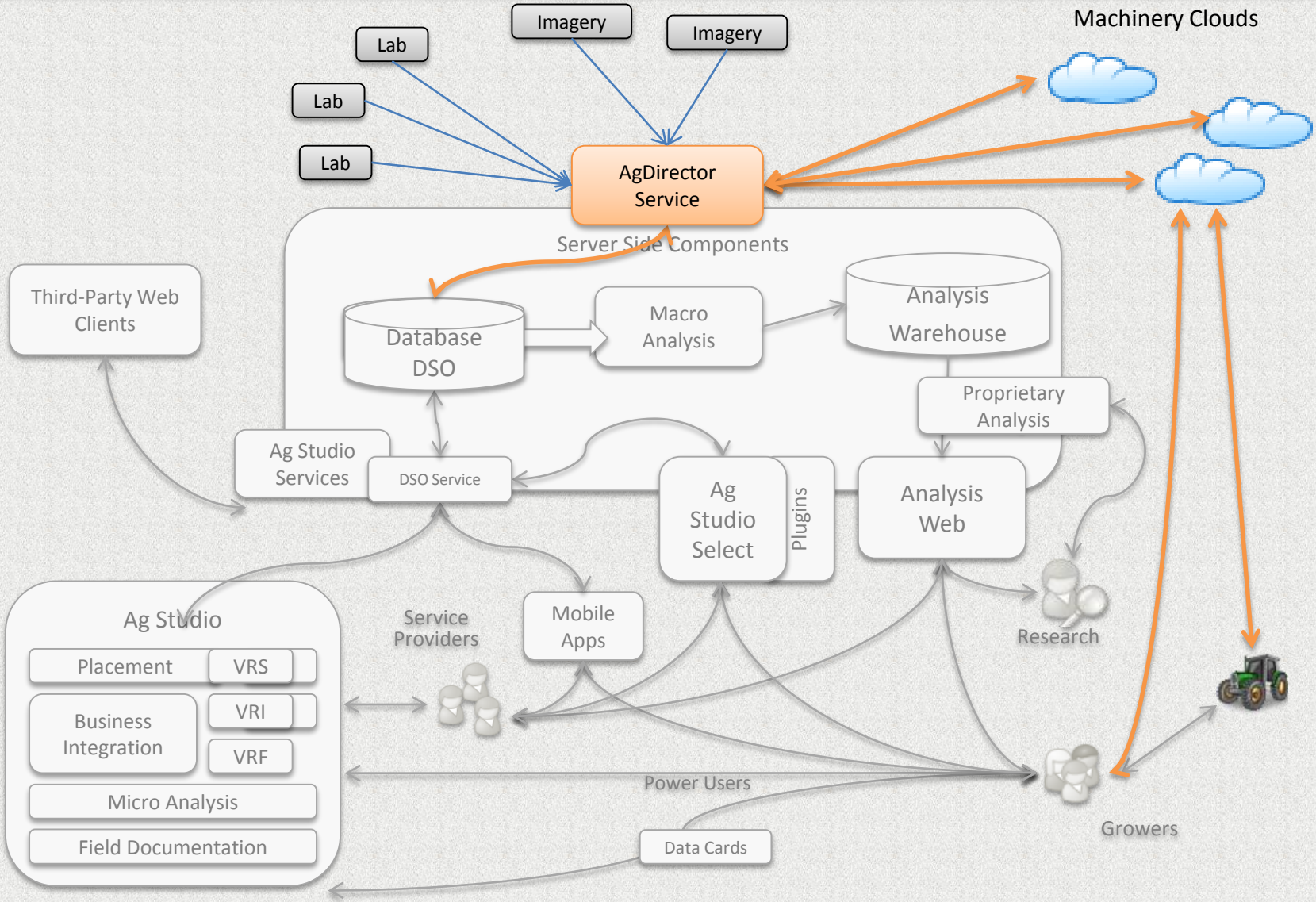
Automating Crop Recordkeeping

- *Preplanning*
- *Device Setup*
- *Learn how to use*
- *Identify tasks explicitly*
- *Use WDT solutions for continuous data capture*
- *Lobby input suppliers for product ID technologies*

Total Solution Vision



AgDirector Service



Hands-Off Data Capture Example

- *Soil Testing – Most any lab*
- *Planting – Precision Planting*
- *Early season imagery – GeoVantage*
- *Nitrogen sidedressing – Raven or Onsite*
- *Full season imagery – SatShot*
- *Irrigation Monitoring – AgSense*
- *Weather Monitoring -- DTN*
- *Grain Harvest – Deere*

Components of Automation

- *Device-to-cloud for initial capture or final delivery*
  - *Current technology race*
  - *Section control*
  - *Guidance*
- *Cloud-to-cloud between companies*
- *API published by one company*
- *API integration by another company*
- *Cross reference identification between systems*
- *Unattended workflow manager*

Soil Test Automation

- *Generate a soil testing work order*
  - *Fields to be sampled*
  - *Directed sampling sites*
- *Generate lab submittal sheets and matching bag labels*
- *Sync work order into sampling software*
- *Sync completed work back into AgStudio*
- *Lab sends results back to AgDirector Service*
- *Notify work is complete*

Veris

- *Building a Work Order Management solution*
  - *Raw data loaded into AgStudio*
  - *AgStudio sends to Veris for cleaning*
  - *Veris sends back to AgStudio*
  - *When soil test results are received, cleaned data is sent back to Veris for post calibration*
  - *Veris sends back calibrated layer*
  - *User receives notice that post calibrated data is now ready for use*

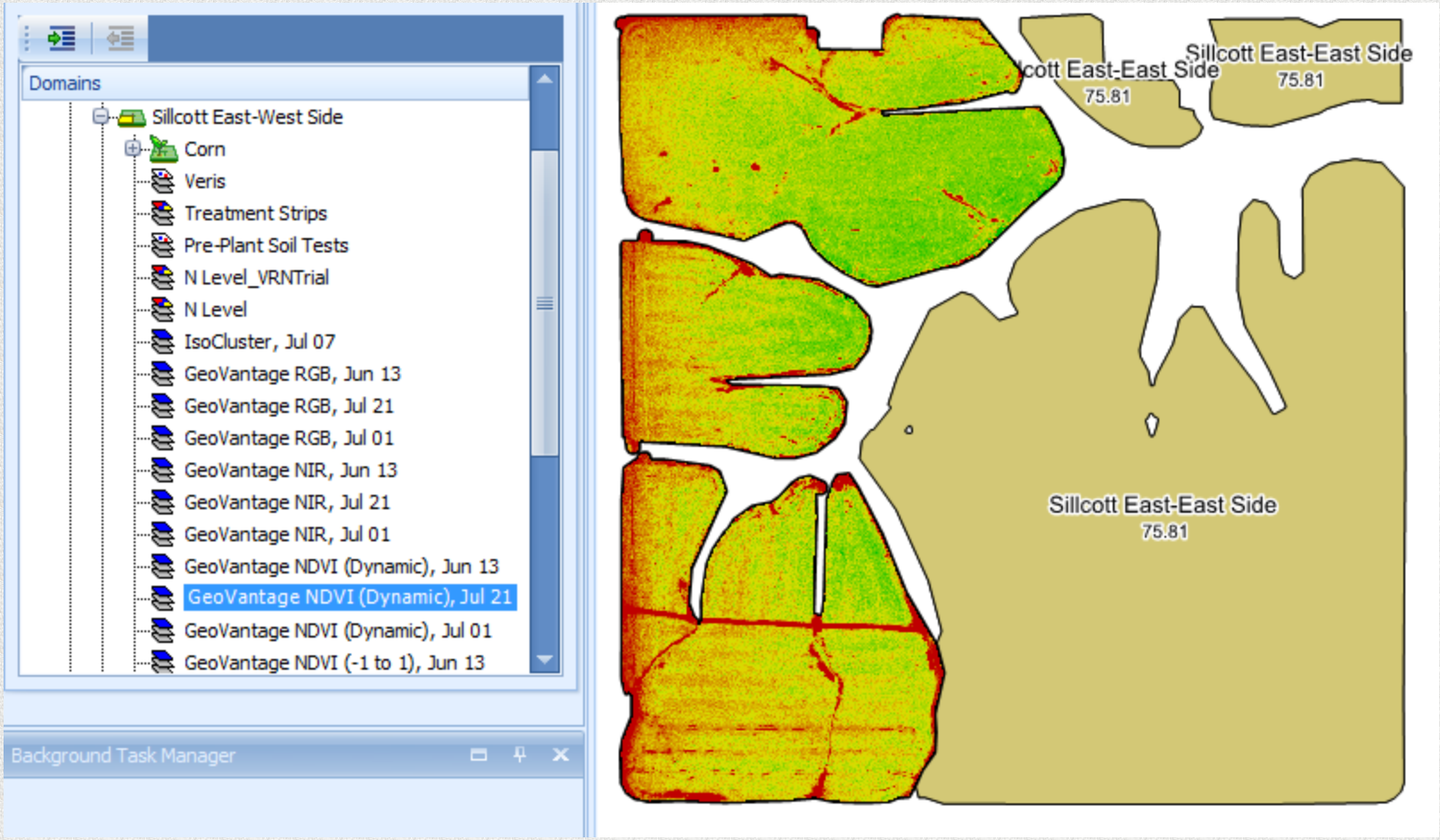
Planting

- *Preseason*
  - *Precision Planting – Setup data sharing in FieldView*
  - *AgStudio – Key in FieldView credentials*
  - *Upload setup info to FieldView Cloud*
- *Plant the field*
- *Log is automatically uploaded to FieldView*
- *AgDirector Service:*
  - ***Polls FieldView periodically to download new files***
  - *Converts to common format*
  - *Imports into database*
  - *Notify of planting documentation availability*

Early Imagery

- *Preseason*
  - *Acquire API and Billing Key from GeoVantage*
  - *Key into AgStudio*
- *Generate a work order*
- *Imagery is flown*
- *AgDirector Service:*
  - ***Polls GeoVantage API periodically to download flown imagery***
  - *Process the raw imagery into all requested analyses*
  - *Import into the AgStudio database*
  - *Notify of imagery availability*

Example Result



Spraying

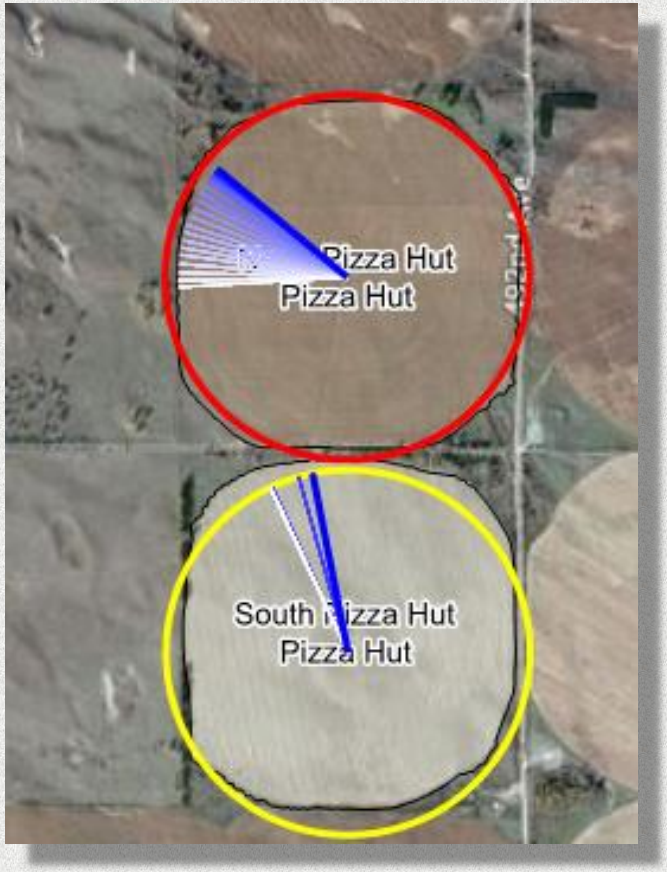
- *Preseason*
  - *Acquire a Slingshot account and Access Key from Raven*
  - *Enter this information into AgStudio*
  - *Upload product info prior to application*
- *Field is sprayed*
- *AgDirector Service:*
  - ***Polls Slingshot periodically to download new files***
  - *Convert downloaded files to a common format*
  - *Import into AgStudio*
  - *Notify of application documentation availability*

Satellite Imagery

- *Preseason*
  - *Acquire an account with SatShot*
  - *Enroll grower with SatShot via AgStudio*
- *Satellite imagery taken*
- *Selected desired images from SatShot UI*
- *AgDirector Service:*
  - *Receives notification of image availability*
  - *Downloads available images*
  - *Imports into AgStudio*

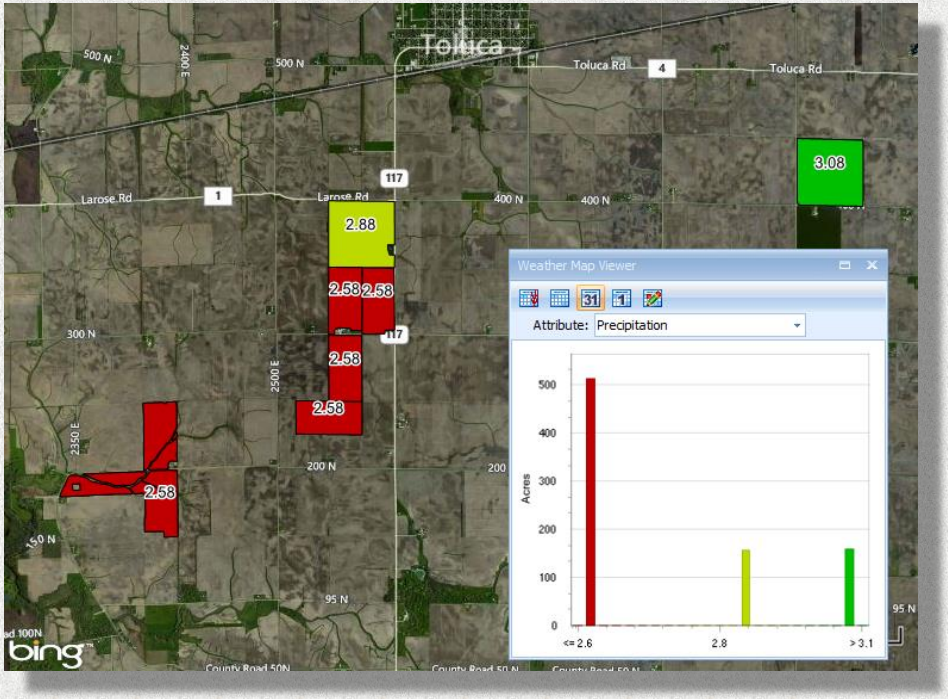
AgSense WAGNet

- *Add-on control panel for most any iron*
- *Wireless connectivity between panel and cloud*
- *Interaction with AgStudio*
  - *–Download pivot definitions*
  - *–Download pivot operating status at any time*
  - *–Download soil moisture and weather station info*
  - *–Download historical watering maps*
  - *–Upload VRI prescriptions*
- *Pivots are controlled via AgSense web and mobile apps*
- *Working on connectivity for grain bin monitoring*



Weather

- *DTN\Progressive Farmer*
- *Daily Values:*
  - *–Precipitation*
  - *–GDU*
  - *–Evapotranspiration*
  - *–CHU*
- *10 year historical data*
- *Subscribing:*
  - *–Acquire account with vendor*
  - *–Enter vendor supplied credentials into AgStudio*
  - *–Upload the centroid of each field for which you want to purchase weather*



Yield Mapping

- *Preseason*
  - *Create MyJohnDeere.com account*
  - *Link AgStudio grower to MyJohnDeere account*
  - *Generate setup cards, w/ variety locator enabled*
- *Field log file automatically uploaded when field is exited.*
- *AgDirector Service:*
  - ***Polls MyJohnDeere for new files to download***
  - *Converts to common format*
  - *Imports into AgStudio*
  - *Notify of harvest data availability*

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Comments

- *Most automated transfer solutions today are file-based.*
- *Most files are the same files you can read from removable media.*
- *Nothing about this process standardizes the data exchange APIs*
- *Nothing about this process standardizes file formats*
- *There is a lot of valuable data that we are NOT yet provided access to.*

Data Privacy – Third Party Integration

- *At customer's request*
  - *Data may be pushed from AgStudio to third-party*
  - *Building a framework to describe*
    - *What data must be shared*
    - *Why*
    - *How identified*
  - *MapShots is NOT responsible for third-party's policies and/or actions*

Third-party Alternatives

- *There are add-on alternatives to OEM.*
  - *Some are just file transfers through alternate in-cab or portable devices (AgIntegrated Onsite)*
  - *Some are ISO sniffers*
- *AgDirector Client for remote archive and upload*

Summary

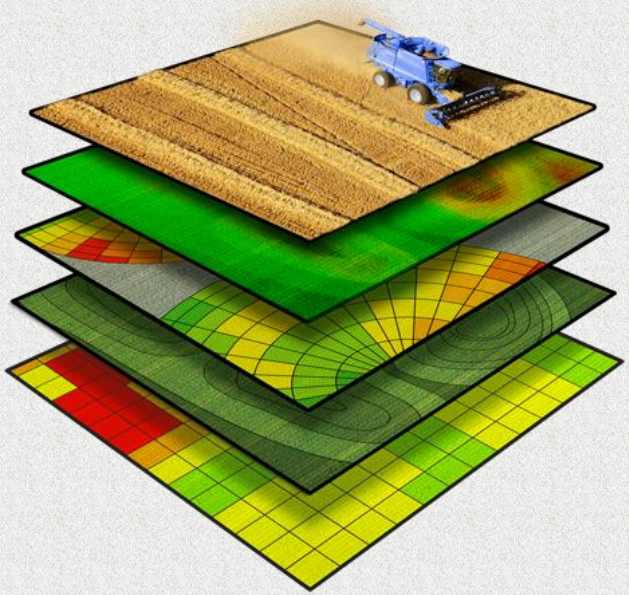
- *Device-to-cloud is currently the controlling technology*
- *Cloud-to-cloud is bound to business agreements and data sharing policies*
- *There is lack of standardization of APIs, but OADA is working to address this*
- *Data sharing is proceeding, in the absence of data format standardization*
- *Data privacy concerns are one of the most significant barriers to advancing automatic data capture.*

What Keeps Us Up At Night

- *Tools to clean and correct junk / incomplete data*
- *RUSLE/Sustainability documentation*
- *Double-crop automation*
- *Business system integration*
- *Open vs Proprietary USDA reporting*

MapShots

Providing the agricultural industry with powerful and efficient tools for managing large amounts of agronomic crop production data.



For more info please visit: www.MapShots.com