Transitioning from Files to Field Operations APIs

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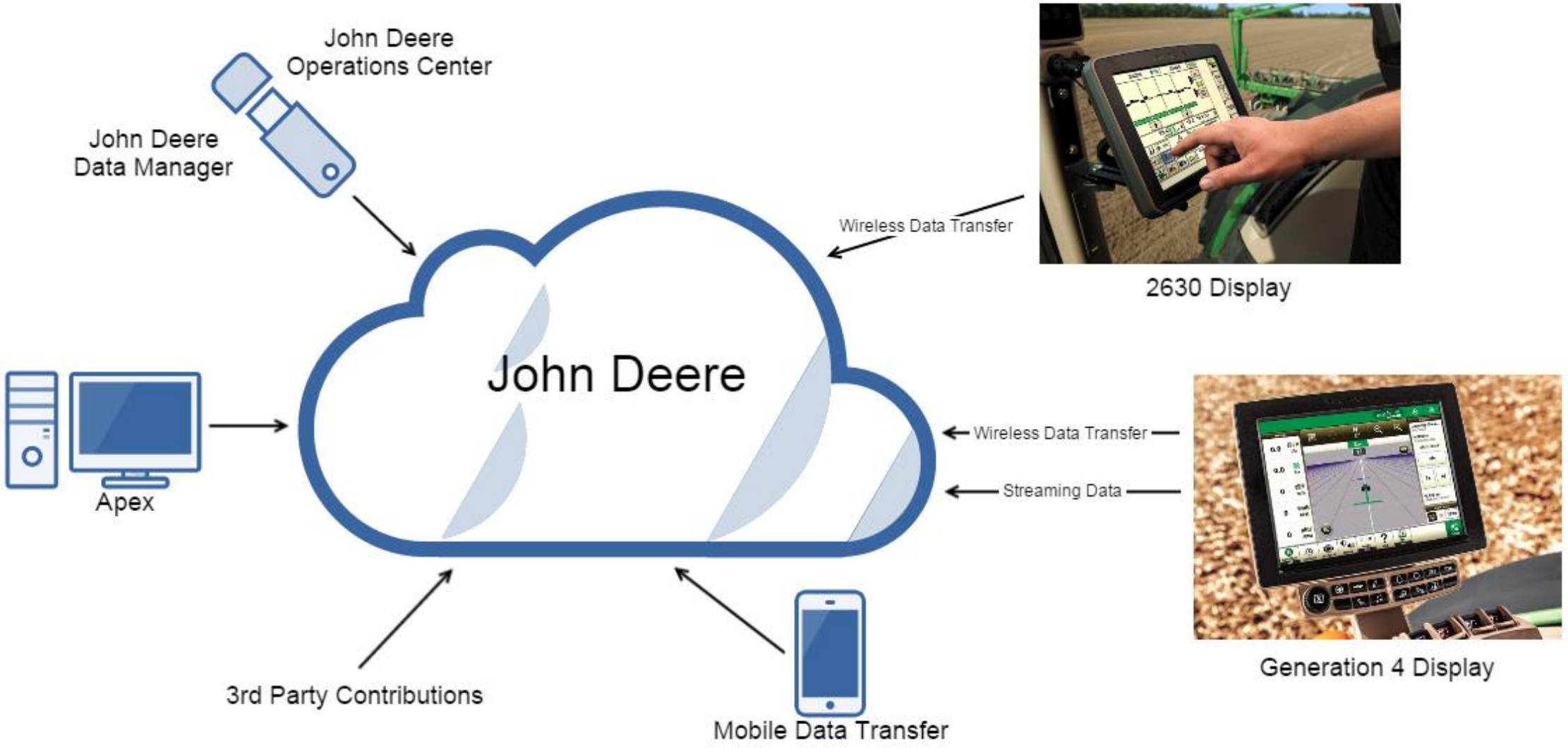
Course Outcomes

- Unlocking historical Apex data and Gen4 display data
- Accessing documentation data when a grower is using granular field sharing
- Understanding John Deere’s processed data shapefile content
- Optimizing the API integration for downloading any new processed data
- Determining whether processed data APIs are right for your company

Files Review

Sources of Data



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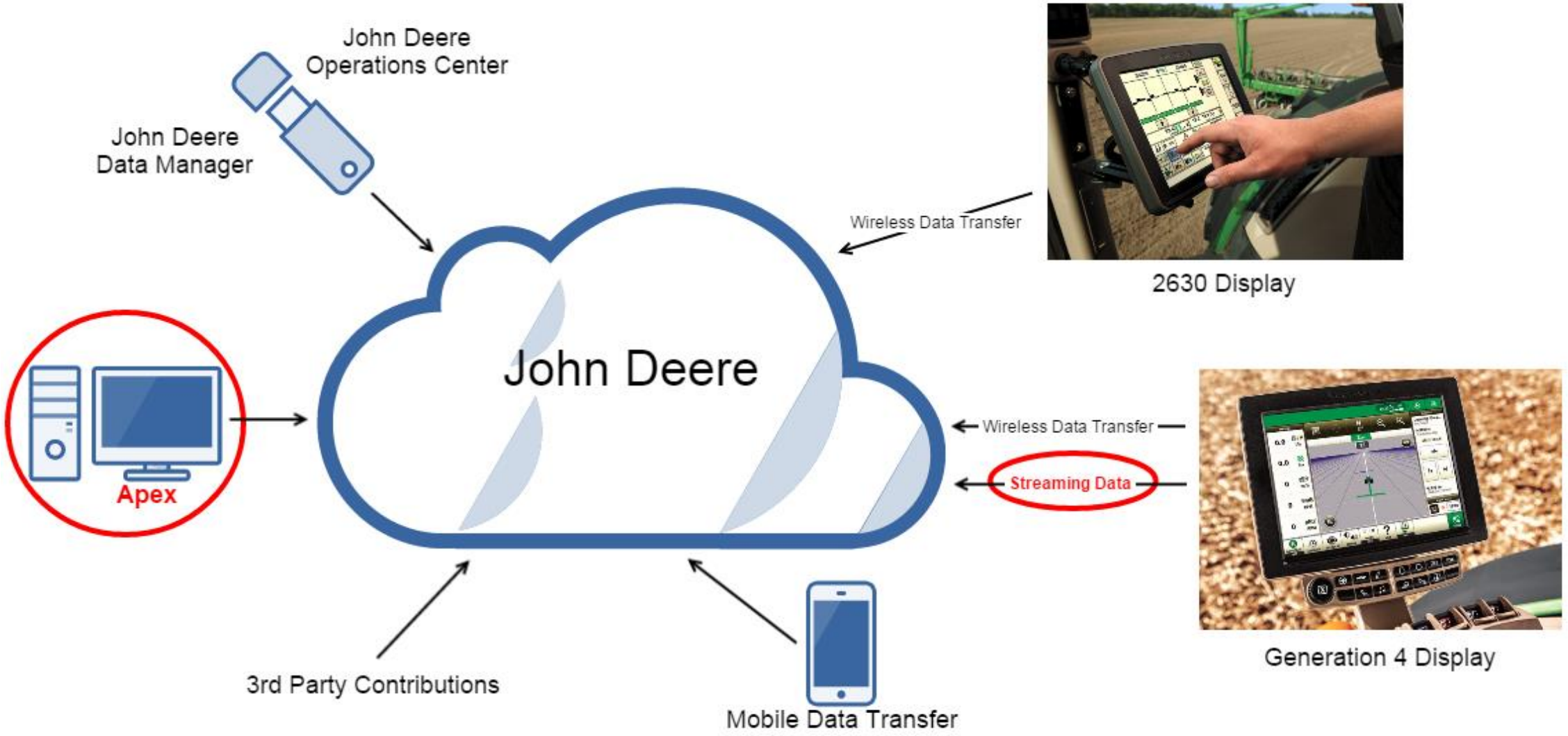

Files Review – Apex Backups

- Historical seasons of data
- May be many GBs for a single organization
- Do not show in the Files API
- Are included in processed data

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Files Review – Gen4 Data

- Default: Gen4 data comes in via streaming
  - This data does not have a raw file representation
  - The data is available in processed data

- The operator can manually send a WDT file if desired
  - This data *does* show up in the Files API

- John Deere is investigating repackaging the streamed data into raw files

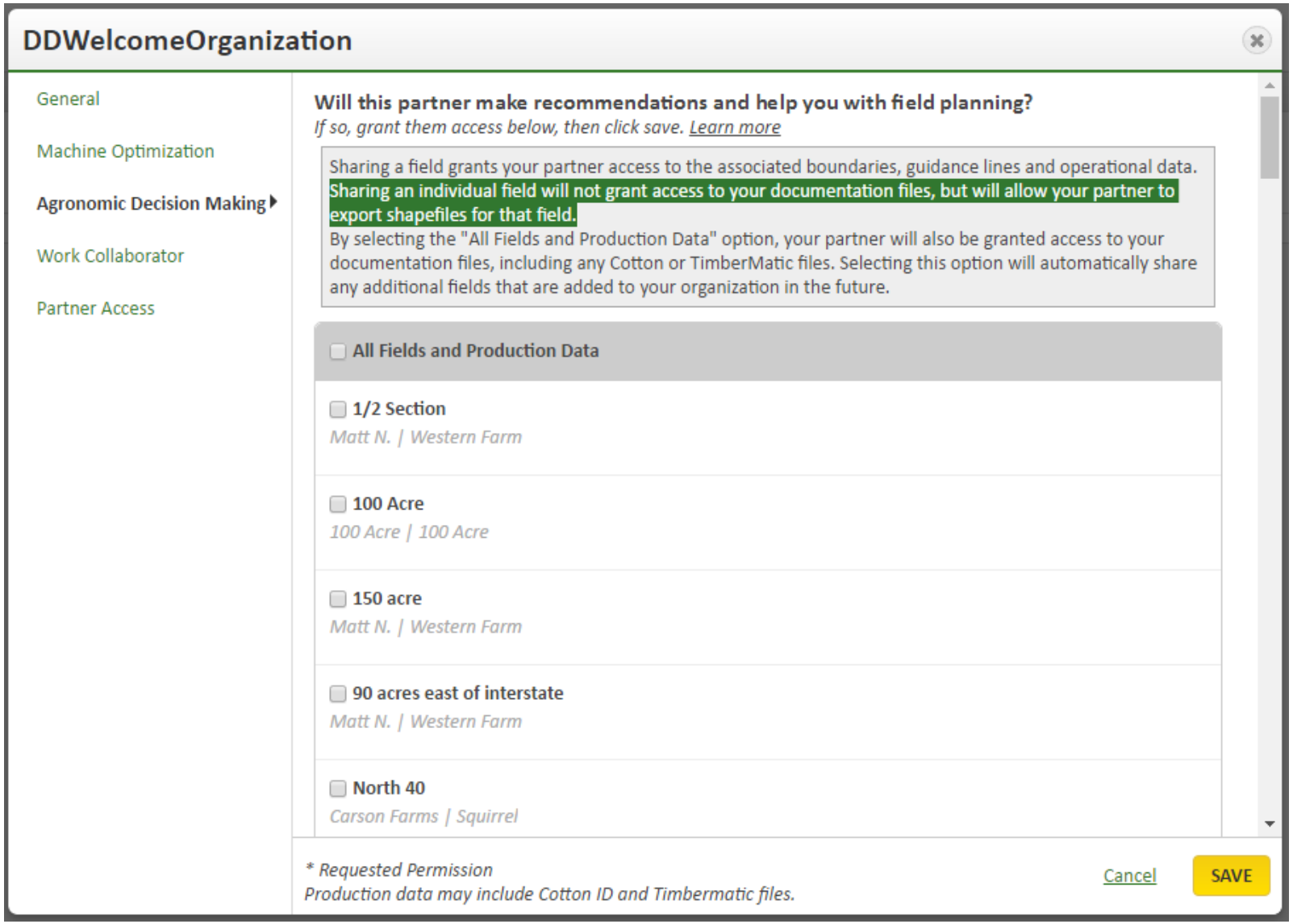
- Alternatively, the data can be exported via USB and processed via ADAPT

Files Review – Granular Sharing

A single Doc file may contain data for multiple fields.

Granular Sharing of fields does not grant documentation files!

The processed data for these shared fields *is* available.



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Processed Data

(Field Operations)

Advantages of Field Operations

- Access to all processed data
  - Processed files
  - Apex backup data
  - Generation 4 streaming data

- Edited data
  - Post-calibrated
  - Spatially sorted into the correct field
  - Additional data editing to come?

- Access to a partner’s field data when using granular field sharing

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Cautions

- Not all data from the raw files is in the processed data
  (e.g. machine serial number, fuel used, elevation)
- If you need more than the below supported fields, please tell us!

Seeding
Crop
Variety
Control Rate
Target Rate
Applied Rate

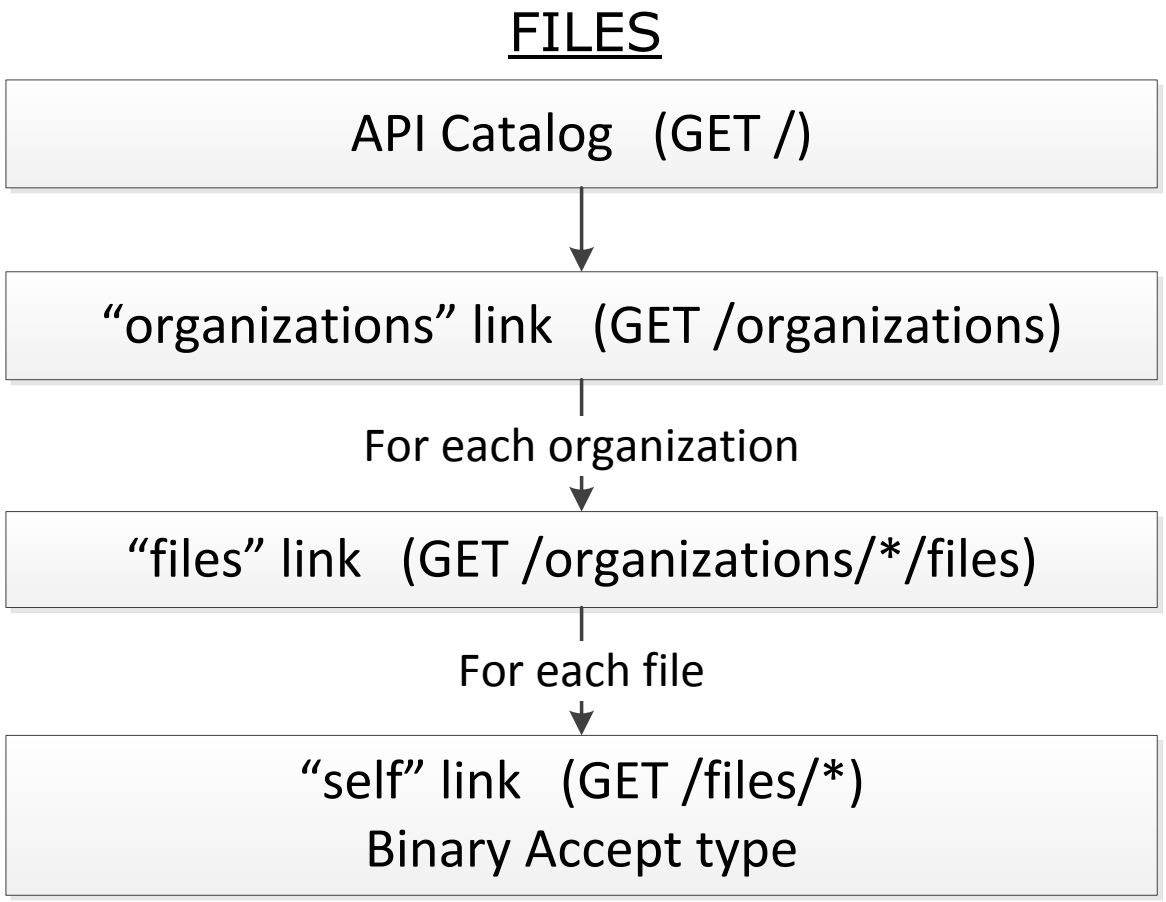
Application
Product
Control Rate
Target Rate
Applied Rate

Harvest
Crop
Variety
Wet Mass
Moisture
Yield by Volume
Yield by Mass
Yield by Bales
Trash (cane)

Tillage
Not Currently Available

Time | Heading | Distance | Swath Width | Section ID

Finding All Available Field Operations



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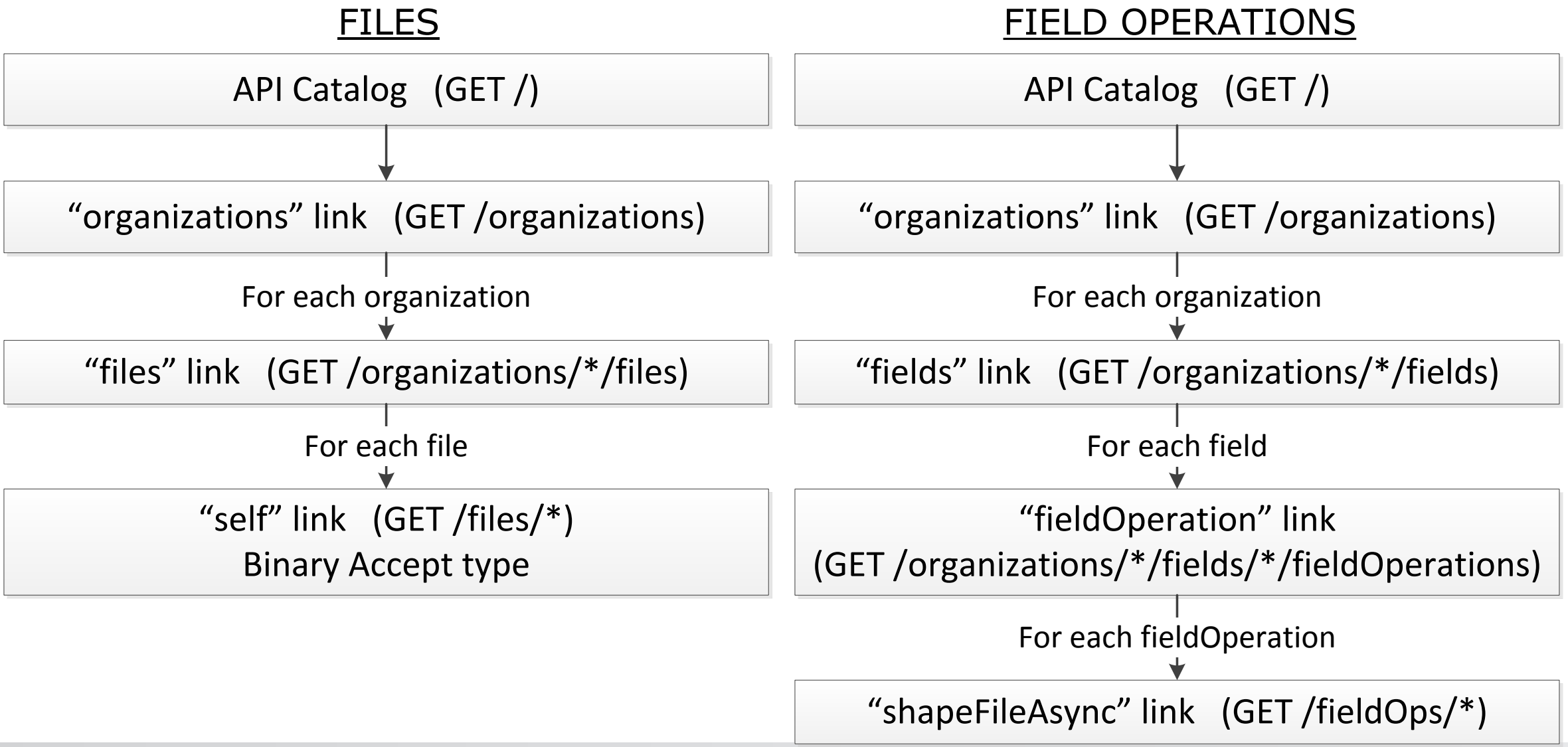
Finding All Available Field Operations



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Access Control and Links

Reminder: Links will not be present if you have not been given access to that resource by the owning organization!

The “files”, “fields”, and “fieldOperation” links are all conditional based on your customer setting up the appropriate sharing permissions with your organization.

The “shapeFileAsync” link is also conditional on the operation type being supported (i.e. not a tillage operation).

Limiting Results to New/Updated

- Data for a single "operation" may arrive over a period of time
  (e.g. a multi-day harvest event)
- This data may arrive non-chronologically (e.g. via manual file uploads)
- John Deere groups this data together into a single fieldOperation
- This means that additional data may arrive after you have downloaded a shapefile
- There is a way to find these "updated" fieldOperations, plus any new ones, while ignoring all others!

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Limiting Results to New/Updated - DeereTags

- A “DeereTag” is a mechanism that clients can use to request only *changes* in a list since a previous call
- To use this feature, supply the X-Deere-Signature header in your request
- The response will contain the same header with a guid
- On your next call to the same URI, supply X-Deere-Signature=<guid>
- The response will contain either
  - A 304 Not Modified response, if no changes since the previous call, or
  - A list of changes, along with a new X-Deere-Signature guid for your next call

Limiting Results to New/Updated – DeereTags + Embeds

- In the case of Field Operations, receiving additional point data *may* not cause a change to the start/end dates of the operation
- To catch these rare cases, we can combine DeereTags with an embed
- A fieldOperation has associated summary data called measurementTypes
  - Total area worked, Total yield, etc
- These measurements can be embedded into your fieldOperations call
  - GET /organizations/*/fields/*/fieldOperations?embed=measurementTypes
- Including this embed allows the DeereTag to detect any change in totals as an updated operation

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Async Shapefile API

How Does It Work?

- Some operations are very large, and may take some time to generate the shapefile. Resulting files may be large and take a while to download fully.
- We have made the API asynchronous in order to avoid timeouts
- When calling the shapefile API, you may receive the following responses:
  - 202 Accepted – File generation has been queued
  - 307 Temporary Redirect – The file is ready at the redirect location
- The 307 response will contain a Location header to a pre-authorized download location, which is valid for no less than one hour

How To Know When the File Is Ready

- Clients will need to poll the URI for status updates until receiving the download location
  - Each response will be a 202 until the file is ready
  - Don’t worry, the file will only be generated once

- We ask that you poll via an exponential backoff algorithm, starting at 1 second and doubling each call

- Webhooks would be great… we know, and we are sorry. Feel free to provide feedback to APIDevSupport@JohnDeere.com if this feature is important to you.

What To Do With the Download Location

- The file can be downloaded by doing a GET upon the download URL
  - Accept:
  - Content-Type: application/zip

- The response should be written to a zip file

- Note that the download location is cross-domain and should NOT include an authorization header!

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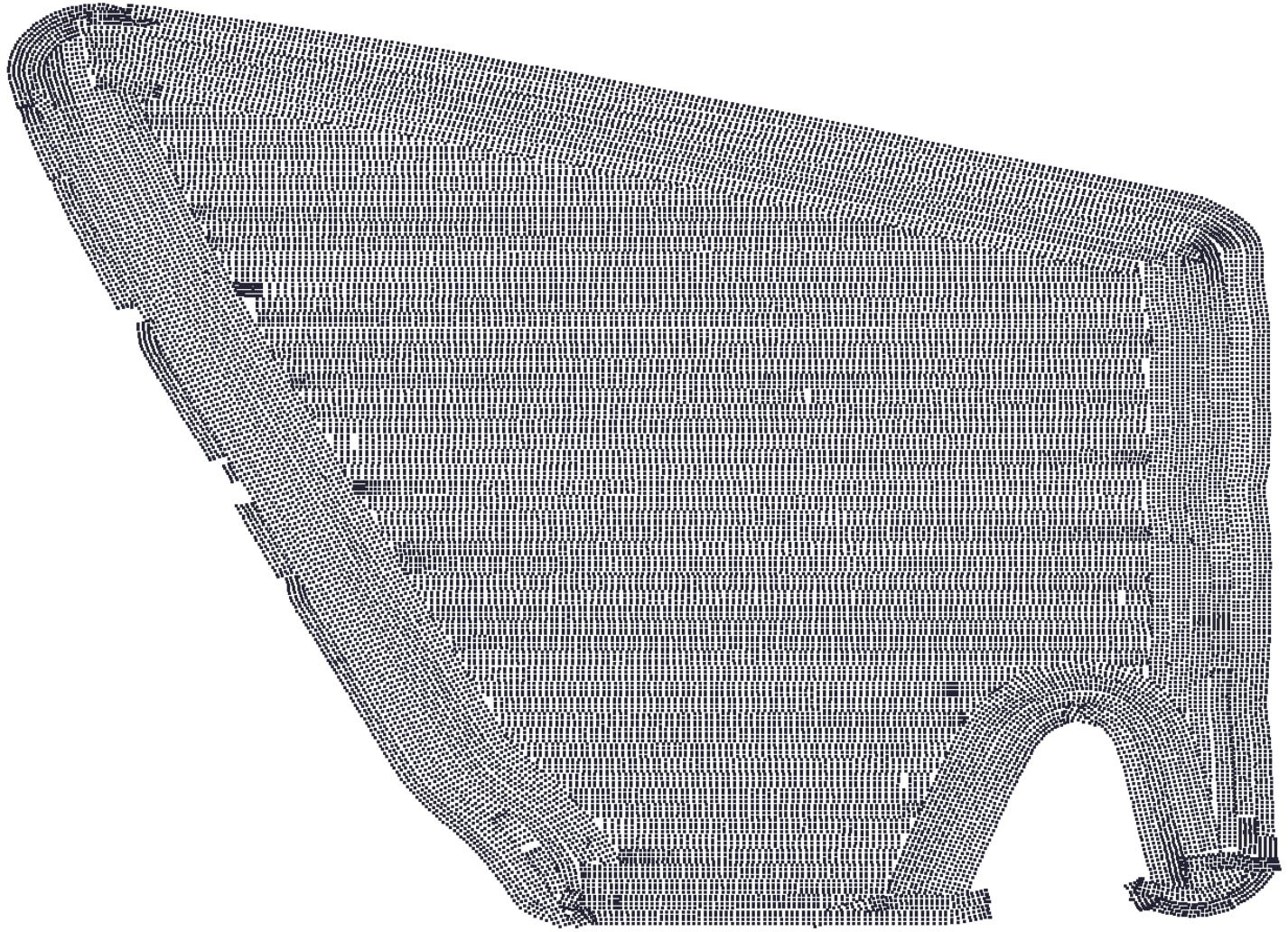
What If the Shapefile Is Out-of-Date, or My Access Expires?

- As we saw before, an operation may be “updated” with additional data
- The Async Shapefile API will regenerate files if they are no longer current
  - The initial response will again be 202
- Each 307 response from the Shapefile API will generate a new pre-signed URL, good for another one hour minimum

Shapefile Details

Dissecting a Shapefile – .shp file

- The shape can be viewed in any GIS software
- Demonstration via http://mapshaper.org/



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Dissecting a Shapefile – .dbf file

- View the data inside of a shapefile .dbf
- This file can be previewed in Excel

Time	Crop	AppliedRate	SWATHWIDTH	DISTANCE	Heading	SECTIONID	ControlRate	TargetRate	Variety
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2509	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2510	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2511	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2512	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2513	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2514	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2515	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2516	32999.99890000	32998.06726825	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2517	35000.00090000	34997.21434092	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2518	35000.00090000	34997.21434092	N74R
4/11/2015 9:38:31 PM	173	0.00000000	2.50000000	2.67727970	357.55682373	2519	35000.00090000	34997.21434092	N74R

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Dissecting a Shapefile - .json (Deere metadata file)

- Open the JSON metadata file
  - Contains the units associated with the dbf data
  - English vs Metrics is based on organization preference
  - Units can be interpreted via the ADAPT representation system
    - seeds1ac-1 translates to seeds per acre


```
"DataAttributes": [
  {
    "Name": "Time",
    "Description": "Timestamp"
  },
  {
    "Name": "Crop",
    "Description": "CropId"
  },
  {
    "Name": "AppliedRate",
    "Unit": "seeds1ac-1",
    "Description": "Applied Rate"
  },
  {
    "Name": "SWATHWIDTH",
    "Unit": "ft",
    "Description": "Width Of Element"
  },
```


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Processing a Shapefile

- To process shapefile data, use an ESRI Shapefile Reader
- Many open source libraries are available for this purpose

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Next Steps

Getting Access

- The Field Operations API is currently in Alpha status, soon moving to Beta
- Access can be requested from ApiAdmin@JohnDeere.com

Additional Resources

- developer.deere.com documentation
- Sample seeding, application, and harvest shapefiles
- Java sample code

Questions?

Support -

- View documentation or submit a ticket on developer.deere.com
- E-mail: APIDevSupport@JohnDeere.com
- Twitter: @JohnDeereAPI
- Support line: 1-515-253-6870 (8:30am-5:30pm US central)
- Visit us at the Open Technical Sessions

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