

# PrecisionPlanting.ADAPT.2020 Plugin

The PrecisionPlanting.2020.ADAPT Plugin reads all .2020 files from the Precision Planting® 20|20 Generation 3 monitors. This software component replaces the Precision Planting FODD driver for .2020 files. Please note that the 20/20 SeedSense Generation 1 or Generation 2 monitors generate .dat files in the Climate FieldView format and are readable by the Climate FODD.

The attached zip file contains the .Net DLLs and a corresponding nuget package to integrate this plugin into your software.

## ADAPT

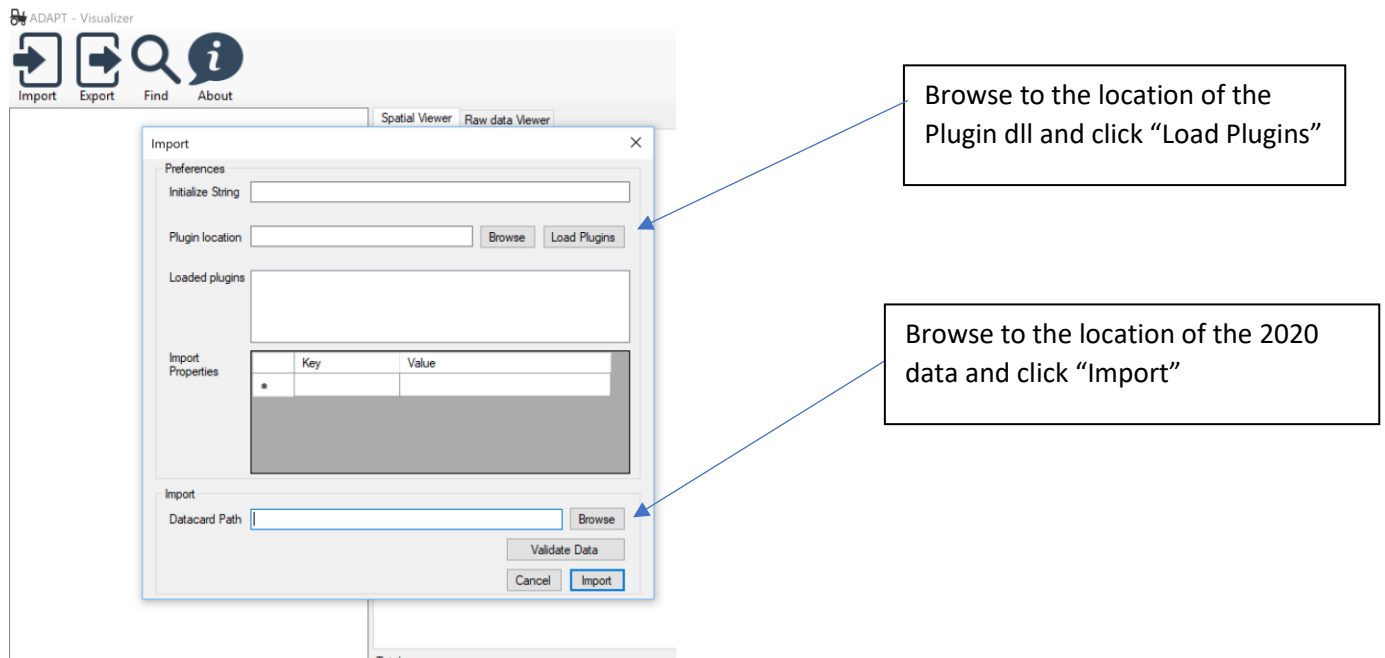
ADAPT is an open-source, industry defined specification for agricultural field operation data sponsored by [AgGateway](#). The source code is available on [Github](#). ADAPT has recently released version 2.0 of their framework, and we are including a version of the plugin supporting both that and the older 1.2.0 version.

## FODM/FODD

[FODM](#) is an earlier approach to standardizing Field Operations data. ADAPT has been developed to replace FODM by a wider group of industry participants.

## ADAPT Visualizer

The ADAPT project contains an open source .Net [Visualizer](#) program. To examine the contents of a 2020 file, build this software, and do the following in the 'Import' dialog:



## Consuming the Plugin

To integrate the 2020 Plugin into your software, reference the Plugin using the included nuget package or referencing the DLLs directly. Then, add a reference to the AgGatewayADAPTFramework package for the targeted version from nuget.org.

Within your code, instantiate the PrecisionPlanting.ADAPT.2020.Plugin class and invoke the import method with the path to the 2020 data.

## Property Settings

The 2020 plugin supports customizing the contents included in the ADAPT ApplicationDataModel through passing one or more properties into the second parameter of the Plugin.Import() method.

Setting Name	Values	Behavior
<b>Downforce</b>	True/False	Include Downforce data
<b>SeedingQuality</b>	True/False	Include Seeding Quality data
<b>SmartFirmer</b>	True/False	Include SmartFirmer data
<b>SmartDepth</b>	True/False	Include SmartDepth data
<b>FurrowForce</b>	True/False	Include FurrowForce data
<b>Insecticide</b>	True/False	Include data for any Insecticide application
<b>Fertility</b>	True/False	Include data for any Fertility application
<b>Hertz</b>	1/5	Return down-sampled 1HZ data or raw 5HZ data.

If no property parameters are specified for any of the above, the relevant data is returned and down-sampled to 1HZ.

## Export

The plugin currently only supports import of data from 2020 files. Consumers should continue to use existing methods of writing prescriptions.

## Data Formatting

The data within the ADAPT ApplicationDataModel uses the following conventions

### Summaries

Totals/Summaries recorded by the 20|20 for an operation are included under Documents/Summaries. Per-product summaries are under OperationSummaries, and all products summaries are under SummaryData.

### ADAPT Representations

Where a standard ADAPT Representation exists, we report values under that Representation. E.g., vrSeedRateSeedsActual. Where Precision Planting custom types occur, we use a Representation of CodeSource = UserDefined. E.g., "Furrow\_Moisture." See the appendix for a list of representations.

### *Operation Data*

There will be one set of `OperationData` objects per region of the operation. If Insecticide or Fertilizer was applied alongside Seed, these data will be separate `OperationData` objects with correlated timestamps. In ADAPT 2.0, you may use the `OperationData.CoincidentOperationDataIds` property to identify such correlated data.

### *Null Values*

In the case of `SpatialRecords` that have `<null>` `WorkingData` values, the `<null>` represents a case where no value was logged by the sensor. For the purposes of interpreting this data where other `SpatialRecords` on corresponding `WorkingData` objects contain values, consumers may wish to consider interpolating values from other `SpatialRecords` vs. treating these values as 0, depending on the nature of the sensor.

### *Inline Offsets*

ADAPT provides a detailed model for modeling the implement offsets. The inline offsets as recorded in ADAPT have the following meanings:

- `MachineConfiguration.GPSXOffset`. The distance the GPS receiver is forward of the rear axle.
- (Tractor) `HitchPoint.ReferencePoint.XOffset`. The distance the hitch is backward of the rear axle.
- (Implement) `HitchPoint.ReferencePoint.XOffset`. The distance the hitch point is forward of the implement reference point.
- `ImplementConfiguration.ControlPoint.XOffset`. The distance the implement reference point is backward of the hitch. (This value is the inverse of the prior item).
- `SectionConfiguration.InlineOffset`. The distance the section reference point is backward of the hitch.

Positive values are forward and negative values are backward. The `EquipmentConfiguration` objects model the Connector mappings of the `MachineConfiguration` (in most cases tractor) to the `ImplementConfiguration`.

### *Lateral Offsets*

Positive values are right of the reference point from the point of view of the driver's seat, and negative values are left.

### *Multiple Hybrids*

If an operation contains multiple hybrids, the data follows these conventions

- If the planter supports Multi-hybrid capabilities (Precision Planting mSet or vSet Select), the data will include a "vrProductIndex" datum for each row. This value maps to the Reference ID of the product in the ADAPT ApplicationDataModel Catalog.
- If the planter is configured with left/right varieties or a similar partial planter configuration, the `OperationData` will include an intermediate operation device depth with a "vrProductIndex" defining the product for the governed rows. The rows may be associated to their parent portion of the implement by referencing the `DeviceElementUse's` `DeviceElementConfiguration` and its associated `DeviceElement`. The `DeviceElement` will have a `ParentDeviceId` associated to the corresponding element that maps to the `DeviceElementUse` reporting a `vrProductIndex`.

## Appendix: Representations

Representation Code	Unit of Measure
<b>General</b>	
vrProductIndex	n/a
dtRecordingStatus	n/a
vrVehicleSpeed	Miles per hour
vrHeading	Degrees
vrDistanceTraveled	Feet
<b>Seeding</b>	
vrSeedRateSeedsTarget	Seeds Per Acre
vrSeedRateSeedsActual	Seeds Per Acre
<b>Seeding Quality</b>	
vrPlantingSingulation	Percent
vrPlantingSkips	Percent
vrPlantingDoubles	Percent
NewSeeds	Count
Vacuum	kPa
<b>Harvest</b>	
vrYieldWetMassFlow	Pounds per second
vrHarvestMoisture	Percent
vrYieldMass	Pounds
vrYieldWetMass	Pounds
vrYieldWetVolumePerArea	Bushels per Acre
vrYieldVolumePerArea	Bushels per Acre
vrTotalAreaCovered	Acres
CombineDirection	Enumeration
GrainLossReturns	Count
GrainLossRotorLeftRaw	Count
GrainLossRotorRightRaw	Count
GrainLossShoeAverage	Count
GrainLossShoeLeftRaw	Count
GrainLossShoeRightRaw	Count
GrainLossTotal	Count
dtHeaderStatus	On/off
FeedHousePositionDegrees	Degrees
SeparatorStatus	On/off
dtUnloadingAugerState	On/off
AugerPositionDegrees	Degrees
vrEngineSpeed	RPM

<b>Fertility</b>	
vrAppRateVolumeActual	Gallons per Acre
Liquid_Pressure	PSI
<b>Insecticide</b>	
vrAppRateMassActual	Pound per acre
<b>Downforce</b>	
vrRideQuality	Percent
vrGroundContact	Percent
vrDownForceMargin	lbf
vrDownForceApplied	lbf
<b>Smart Firmer</b>	
Uniform_Furrow	Percent
Spacing_Variation	Percent
Organic_Matter	Percent
Furrow_Moisture	Percent
vrSoilTemperature	Degrees Fahrenheit
Clean_Furrow	Percent
CEC	Meq/100g
<b>Smart Depth</b>	
Smart_Depth	Inches
<b>Furrow Force</b>	
Applied_Closing_Force	lbf
Closing_Actuator_Pressure	PSI
Closing_Margin	lbf
Good_Closing	Percent
Closing_Uniformity	Percent