

# Precision Agriculture: The PAIL Project



## PAIL Assists

- Irrigation Planning
- Soil Moisture Monitoring
- Field Weather
- Remote Weather
- Irrigation Schedules
- Pumping Systems
- Asset Management
- Regulatory Compliance

## PAIL Delivers

- Best Practices
- Use Cases
- Process Models
- International Context
- Specs and Toolkits
- Reference Data
- Data Exchange APIs



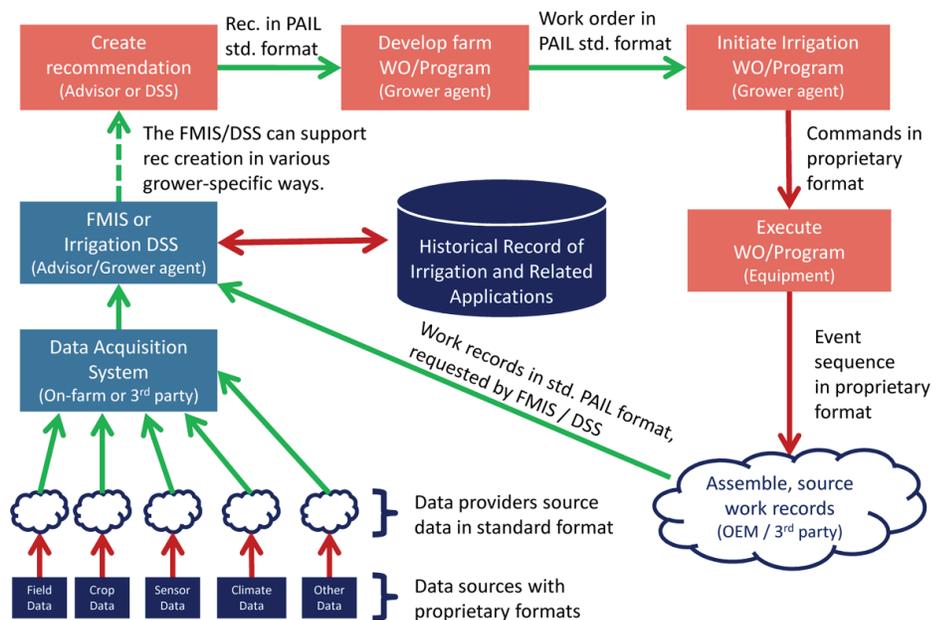
## Precision Irrigation Through Data

From soil mapping to irrigation system operations and reporting, precision irrigation is ever more dependent on the automated capture, transfer and management of data. Standards that allow the free flow of data across multiple brands of equipment allow growers and consultants to make better decisions that use less water and energy, while maintaining or increasing yield.

AgGateway's PAIL Project (Precision Ag Irrigation Leadership) data standards work provides three main benefits for participating companies:

- **Financial Benefits:** By reducing the time and effort currently required of growers to interact with multiple vendor products, vendors increase the likelihood of purchase of their irrigation products and services by removing the barrier to growers of having to learn multiple data systems.
- **Technological Benefits:** Vendors can enable their equipment or software to interact with an irrigation application without having to rewrite specific code every time a partner's software program or application is changed.
- **New Market Opportunities:** Working in partnership or in short-term alliances, vendors can create new market opportunities with data-driven products and services.

### PAIL Irrigation Data Flow



PAIL's vision for data flow in precision irrigation. Flow of data in a PAIL standard format is shown in green; flow of data in proprietary formats is shown in red.

## PAIL Members

As of October 15, 2015

Ag Connections, Agrian, AgSense, Campbell Scientific, CropMetrics, Crop IMS, Decagon Devices, Irrrometer, Irrinet, Iteris, John Deere, J.R. Simplot, Lindsay Corp., MapShots, Monsanto, Northwest Energy Efficiency Alliance, Observant, OnFarm Systems, Ranch Systems, Valmont Industries, Weather Decision Technologies, Inc., Wysocki Produce Farms, ZedX Inc.

## Questions?

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For more information, including materials for joining PAIL, visit:



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## What's in PAIL –Featured content

**Field Observations:** This section standardizes measurements and observations from instruments in the field: readings from soil moisture monitors and sensors, probes, and weather stations. Weather forecasts for regional weather stations are also included.

**Irrigation Work Orders:** Once the data is analyzed the irrigator can send a work order in standard PAIL format to a controller, where an OEM's proprietary commands can execute the request.

**Irrigation Work Records:** A record of how much water was applied, and where, can be sent for reporting or record-keeping purposes when requested.

### The scope of PAIL and how it fits in with other AgGateway projects

	User Requirements	Process definitions	Data requirements	ISO Gap-checking	Infrastructure	Implementation
Reference data APIs	P1	P1	P1	P1	A, P2	P2
Soil Moisture Sensors	P1	P1	P1	P1	A, P2	P2
Field Weather Stations	P1	P1	P1	P1	A, P2	P2
Irrigation Operations	P1	P1	P1	P1	A, P2	P2
Irrigation Work Records	P1	P1	P1	P1	A, P2	P2
Pumps, Flow Meters, Energy	P2	P2	P2	P2	A, P2	P2
Drip Irrigation	P2	P2	P2	P2	A, P2	P2
Surface & Laterals	P2	P2	P2	P2	A, P2	P2
Derived Weather Data	P1	P1	P1	P1	A, P2	P2

KEY - A: ADAPT; P1: PAIL1; P2: PAIL2.

ADAPT is an open-source toolkit being developed by AgGateway to provide the industry with a common, standards-based data model for field operations, and to facilitate data format inter-conversion.

## How you can get involved

- PAIL needs much more than strictly technical work: if you're an expert in the business or agronomy aspects of what we're working on, your user stories will help enrich the project deliverables and make PAIL deliverables better for the entire industry.
- Contact Dan Berne (PAIL Project Mgr.) and discuss how to join the effort!

