Observations & Measurements

Observations in a Nutshell

Problems:

- **Capturing accurate quantitative and qualitative observations about processes in the agricultural value chain is critically important, but very difficult!**
- **Retaining the meaning of data shared with partners and even within organizations is particularly hard.**

Solutions:

- **AgGateway developed an agricultural implementation of the ISO 19156 standard for observations and measurements.**
- **This is now ASABE / ANSI US National Standard S632-2.**
- **The system includes a central repository for definitions of data variables plus a simple process for adding entries.**

AgGateway
Collaboration for eConnectivity

Drive Digital Agriculture with Data

Observations and measurements drive agricultural decisions

Effective decision-making at any point of the agriculture value chain requires data-driven insights. For example, soil moisture, weather conditions and forecasts are critical for planting, irrigation and harvesting decisions. For the observations and measurements to be truly valuable, however, users must share a common and consistent understanding of what the collected data means. This is often very hard to do, and even harder to scale.

Some examples of observations gone wrong

- In 1999 the Mars Orbiter was lost when it came too close to the surface of the planet because NASA used metric units while a contractor used imperial. The root cause of the loss was the "failed translation of English units into metric units" in a piece of ground software.
- Everyone in agriculture has a horror story about receiving a CSV file with very important data, but ambiguous or incomprehensible column names.

AgGateway has a tool for finding solutions: Collaboration!

AgGateway typically implements existing standards, instead of making new ones. In the case of Observations, an ISO standard (19156) existed, but it's an abstract standard that is meant to be adapted to each domain. AgGateway teamed up with ASABE to create a new US National Standard that implements ISO 19156 for agriculture. It's also been presented to ISO as a proposal for a new international standard.

Why is this important to me?

- As an **FMIS company** that collects and shares farm data, I can be confident that the meaning of the data is preserved as it is transmitted.
- As a **crop protection, seed, crop nutrition, feed, or grain manufacturer, distributor or retailer,** I now have a standard way of collecting and communicating quality and other attributes of my products at any point of my process, from R&D to commercial.
- As a **software developer,** I can minimize ambiguity and redundancy of the relevant field and off-farm data.
- As a **grower,** my farm data can be easily and consistently shared with service providers.
- As a **service provider,** I can reduce the amount of time I spend translating data among different systems and can scale up my value-added grower-facing services.

How can I use this framework?

In multiple ways! The reverse side of this document provides your technical staff with helpful resources and instructions on how to use the system.

Observations API

The key to building a common vocabulary for the meaning of Observations is having an easily accessible source.

The operational implementation of the Observations System API contains a growing number of OMCode and OMCodeComponent definitions, and uses an OpenAPI (Swagger) UI that you can try out at URL *https://api.omcodes.org/swagger* or scan the QR code below and follow the swagger link after it.

https://aggateway.atlassian.net/wiki/x/AYC23Q

Questions?

To learn more about this system, including how to request new OMCode and OMCOdeComponent entries, email us at: *cvwg@aggateway.org*

To learn more about ADAPT, visit: *http://www.adaptframework.org*

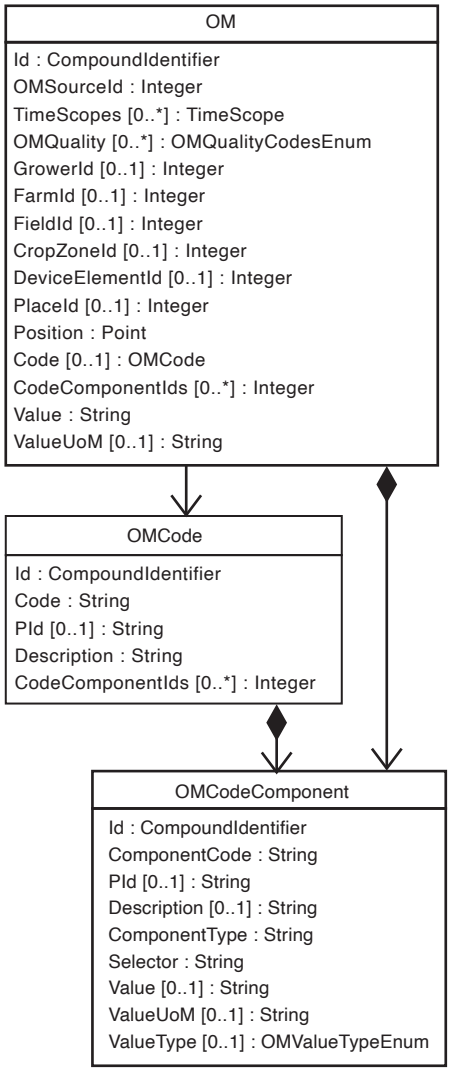
AgGateway
Collaboration for eConnectivity

www.AgGateway.org
Member.Services@AgGateway.org
Phone: (+1) 866.251.8618
Twitter: @AgGateway

Quick intro to Observations for developers

The UML class diagram at right shows some fundamentals of the system. Some key ideas:

- The OM class represents an Observation, which can also mean a forecast, a reanalysis, and so forth.
- Each OM provides ONE value for ONE property (e.g., temperature) on ONE feature of interest (e.g., air).
- The Observation can be put in the context of a grower, farm, field, device, etc.
- Code represents the meaning of the observation, including the property, feature of interest, method of observation, method of aggregation, etc.
- Code is assembled as a sequence of code components, each one of which represents an aspect of the observation's metadata (e.g., the observed property).
- The OMCode and OMCodeComponent classes include a PId property, a persistent identifier (e.g., a URI) that can represent the concept behind the code or code component, and support big data applications, RDF-based systems, etc.
- OMs can be grouped recursively into OMCollections, and these into OMDatasets.



The OM (Observation), OMCode, and OMCodeComponent classes.

FAQs

Q1: There are many data formats out there. Why make yet another?

A1: AgGateway's OM approach gives you a powerful, ag-friendly mix of usability and right-sized semantics. You can express the meaning of an observation with as much detail as you need.

Q2: This framework is nice, but it's missing X (something critical for me). How can I add it?

A2: As with most AgGateway activities, it's usually a matter of showing up and rolling up your sleeves! Just contact cvwg@aggateway.org.

How to use the OM System

You can use this system in three ways:

- **Stand-alone.** You can use Observations in your own software: just clone the classes from the standard or the ADAPT repo, and exchange data using the PAIL standard format.
- **Within ADAPT.** ADAPT framework versions 2.1 and up support OMs, and a PAIL format plugin is in the works; check the page behind the QR code for updates!
- **Within ISO 11783 / ISOXML.** You can leverage LNK elements within LINKLIST files to encode OMs if you need to convey more complex semantics than what is currently supported by ISO data dictionary entries (DDIs).

What we want from you

Check the page behind the QR code. You'll find links to the PAIL / ASABE / ANSI S632-2 standard,an XML schema, ADAPT source code, and ADAPT documentation. Read the material, study the source code, try out the API. Consider using this technology in your software solutions, and reach out to our team if you have questions!