Enabling Interoperability in the Irrigation Sector with PAIL

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Abstract:

AgGateway's PAIL project emerged from an initiative by the Northwestern Energy Efficiency Alliance (NEEA) to optimize the use of energy (and consequently, water) in irrigation. It became clear that a major obstacle to the scalability of this pursuit was the lack of interoperability among the manufacturers of irrigation equipment, environmental sensors, farm management information systems (FMIS) and service providers. NEEA identified developing an industry-wide agreement on data standards as the first step needed to overcome that obstacle; PAIL was created for that purpose.

There have been three major phases in the PAIL project:

1) Requirements-gathering: this included capturing user stories, modeling irrigation processes, and capturing data requirements for exchange.

2) Alignment: Much work went into aligning PAIL's data requirements with the Core Documents model for field operations captured in the SPADE project (Plan, Observations & Measurements, Recommendation, Work Order, Work Record). A second line of alignment work included harmonizing with the ISO 19156 model for Observations and Measurements, in the context of a strong need expressed by some project participants to develop a compact schema that would minimize the transmission of redundant data, and seeking to enable bandwidth-limited data loggers to directly source data from the field. A third set of alignment activities was centered around harmonizing with the ADAPT Common Object Model.

3) Synthesis: Working PAIL data requirements back into ADAPT-compatible objects, and developing schemas to serialize the objects to XML, JSON, etc.

It was agreed between AgGateway and ASABE that PAIL deliverables would be presented to ASABE as a proposed national standard, and the ASABE X632 project was created to contain subsequent work.

The proposed standard is divided into three parts: Definition of core concepts and common data objects (such as identification, time, space and data pedigree); Observations and Measurements (which represents the irrigation - specific implementation of ISO 19156 in an ADAPT-compatible context); and Operations (which represents the irrigation-specific implementation of AgGateway's Core Documents model). This paper describes the three parts of the proposed standard, along with pertinent background information regarding the PAIL development process.

PAIL provides an information technology foundation for effective irrigation management. The proposed standard will facilitate integration of disparate sources of irrigation data, and will enable a new generation of FMIS functionality that makes precision irrigation more practical, and thus more practiced.

Keywords: irrigation, irrigation technology, precision irrigation, standards, information management.

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