ADAPT: A Rosetta Stone for Agricultural Data

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240+ Equipment Companies, Chemicals, Retailers, FMIS, Technology, etc.

ACS
Adifo NV
Ag Connections, LLC
Ag Leader Technology
Ag Retailers Association
AGCO Corporation
AGDATA LP
AgIntegrated, Inc.
Agri
Agricultural Data Coalition
Agrium Inc.
AgSense
AgTrax
AgVantage Software, Inc.
AgVision
AgWorks, Inc.
Agworld, Inc.
AheadRace Software
Albaugh, LLC
Aligned Ag Distributors
American Farm Bureau Federation
American Feed Industry Association
American Seed Trade Association
Ameri
cot, Inc.
AMVAC Chemical Corporation
Area-Wide-e-Laboratory for Food, Agriculture & Environment (ALFAE)
ARMtech Insurance Services
Arysta LifeScience North America
Association of Equipment Manufacturers (AEM)
Aurora Coop
AUVSI — Association for Unmanned Vehicle Systems, International
Barcoding Inc.
BASF
BASF Canada
The Inspiration for ADAPT
The Need of a Rosetta Stone
Interoperability Glossary

**Farm Management Information System** – could be desktop, mobile-based, web/cloud/...

**Mobile Implement Control System** – “equipment display” or system that collects field data or executes work instructions (from FMIS)

**ADAPT Framework** – AgGateway open source SDK, integrated into FMIS systems under AgGateway licensing terms

**ADAPT Plugin** – specific data conversion plugin which can be easily *integrated into a specific instance of ADAPT*. Created by manufacturers and FMIS to allow them to read/write in ADAPT.
# The 5 Primary Components of ADAPT

<table>
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<tr>
<th>Component</th>
<th>Description</th>
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<td><strong>1. ADAPT Data Model</strong></td>
<td>The data elements needed in a wide variety of field operations</td>
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<td><strong>2. ADAPT Framework</strong></td>
<td>Framework managing plugins and data pass through</td>
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<td><strong>3. OEM Plug-ins</strong> (proprietary)</td>
<td>Created and licensed from a terminal manufacturer on how their data system maps into the ADAPT data model</td>
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<tr>
<td><strong>4a. ADM Serialization Plug-in</strong> (open-source)</td>
<td>Used to transfer data from one system supporting ADAPT to another (FMIS ADAPT to FMIS ADAPT)</td>
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<td><strong>4b. ISO Plug-in</strong> (open-source)</td>
<td>Plug-in that will be AEF conformance tested for compatibility with the ISO11783 standard</td>
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<tr>
<td><strong>5. Reference Data API</strong> (open-source)</td>
<td>A RESTful API that provides machine-readable ContextItem Definitions to identify geopolitical-context-dependent data</td>
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1. ADAPT Common Data Model

The Rosetta Stone of ADAPT

- ADAPT’s power is in its common object model
- A common object model for describing field operations, implemented as a collection of extensible business objects
- It is used to map concepts between various proprietary languages
CropZone: A spatial area within a field grown to a crop during a specific window of time. This is fundamentally different from a Management Zone.
2. Plugin Framework

Framework managing plugins and data pass through

3. OEM Proprietary Plugins

Created and licensed from a terminal manufacturer on how their data system maps into the ADAPT data model.
4. Open-Source Plugins

**ADM Serialization Plug-in**
- Used for lossless transfer data from one system supporting ADAPT to another
- *FMIS ADAPT → FMIS ADAPT*

**ISO Plug-in**
- Plug-in that will be AEF conformance tested for compatibility with the ISO11783 standard
5. Reference Data API: Making ADAPT work globally

Geopolitical-Context-Dependent Data

• Each region/country/province has its own geopolitical identifiers
• Need controlled vocabularies (“We call it this/You call it that”)
  • product names, specifications, seed brand, type, traits
• These references will be constantly modified
• So, the SPADE Team implemented a RESTful API to provide a updated machine-readable vocabulary of ContextItemDefinitions;
• “Reference Data API” – only uses the identifier you need based on location
Reference Data API

**ContextItems**

- **Code**: What a given ContextItem contains:

- **Value**: Identifying number (e.g. Gov. ID, geolocation, regulatory number)

- **ValueUoM**: Unit of measure for Value.

- **TimeScopes**: Temporal context.

- **NestedItems**: Used for multi-attribute data. Enables a hierarchical organization of nested ContextItems (e.g. survey connected to a field)
ADAPT Overview

- The **red** arrows show **data import** from a farm machine.
- The **blue** arrows show an FMIS-to-FMIS **data transfer**.

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**FMIS A**
- Farm mgmt. software
- ADAPT Object Model
- Proprietary MICS plug-in
- ADAPT plugin
- ADAPT format

**FMIS B**
- Farm mgmt. software
- ADAPT Object Model
- ADAPT plugin
- ADAPT format

**Reference Data API**

**Internet**

**File Transfer (NOT in scope of ADAPT!)**
ADAPT Overview

- The red arrows show data import from a farm machine.
• The red arrows show data import from a farm machine.
ADAPT Overview

- The **blue** arrows show an FMIS-to-FMIS data transfer.
• The **blue** arrows show an FMIS-to-FMIS data transfer.
ADAPT is an Open Source Software (OSS) project

Business Advantage:
• An Open Source *community* provides a way for individuals and companies to collaborate on projects that would be difficult to achieve on their own.

• No service fees.

Technical Advantage:
• With source code readily available, users will help you debug quickly and *promote rapid code enhancements.*
ADAPT Status: Ever Evolving

Future direction

- **Technical**
  - Include Observations & Measurements
  - Full integration of PAIL
  - Containers, container use, supply-chain interfacing
  - Extensible, API-mediated representation system

- **Business & Technical**
  - Recruit more plug-in writing companies
  - Work on encapsulating report descriptions
  - Incorporating a more formal provenance model
Committed to Support ADAPT

Committed to Plugin

- AGCO Corporation
- Ag Leader
- Claas
- Case IH
- Climate Corporation
- Deere & Company
- Hemisphere GNSS
- Kverneland
- Müller-Elektronik
- New Holland
- Praxydin
- Premier Crop Systems
- Raven Industries
- Topcon Precision Agriculture
- Trimble Navigation
- IoF 2020 (Proof of Concept)

Committed to Integrate Framework

- 365FarmNet
- Ag Connections (Syngenta)
- Ag Integrated Corporation
- Agrian
- Conservis
- EFC Systems
- Fairport Farm Software
- Kverneland
- Mapshots (Corteva)
- Premier Crop
- MyAgData
- Red Wing Software
- SSI/AgVance
- TechnoFarming
- ZedX

IOTF
Getting Started
Talk to Others in the Community

Many resources are available at AdaptFramework.org

- Links to GitHub repositories
- Links to ADAPT Overview
- Links to ADAPT Application Notes
- Links to Frequently Asked Questions
- Links to online videos

- Constructive feedback is always helpful and contributions are welcome. Please use adapt.feedback@aggateway.org
Thank You

To learn more, go to
AdaptFramework.org
Or
AgGateway.org

IoF2020.eu