

U.S. Animal Health Management System

Cross-Boundary Collaboration and Partnerships

Commonwealth of Pennsylvania et al.

Executive Summary

Working with a contract vendor, the Pennsylvania Department of Agriculture (PDA) designed and implemented a statewide animal health database in 2004, a related laboratory information management system (LIMS) in 2006, and a plant industry management component in 2007. Now known as U.S. Animal Health Management System (USAHMS), the integrated software includes real-time interfaces to the U.S. Department of Agriculture (USDA) and supports emerging standards from the U.S. Department of Homeland Security (DHS). These are all designed for cross-boundary exchange of information related to animal health, agriculture and bioterrorism. Equally important, it represents the cross-boundary efforts of agriculture agencies in five states to leverage their individual resources for commonly shared goals.

During the first two years of the software’s existence, PDA worked with the Kentucky Department of Agriculture (KDA) and the Indiana Board of Animal Health (BOAH) under an informal code-sharing agreement. In 2006 PDA formed the Animal Health Information Management Consortium (AHIMC), focused on promoting common goals, including leveraging software and funding strategies. All members share software, separately underwrite state-specific requirements, and jointly fund mutually beneficial enhancements. The member states have invested \$3.4 million, with additional functionality planned for 2008. Under terms of the Consortium, enhancements funded by any one member are available to all at no additional cost. The accompanying table shows the PDA initial investment and that of other members of the Consortium.

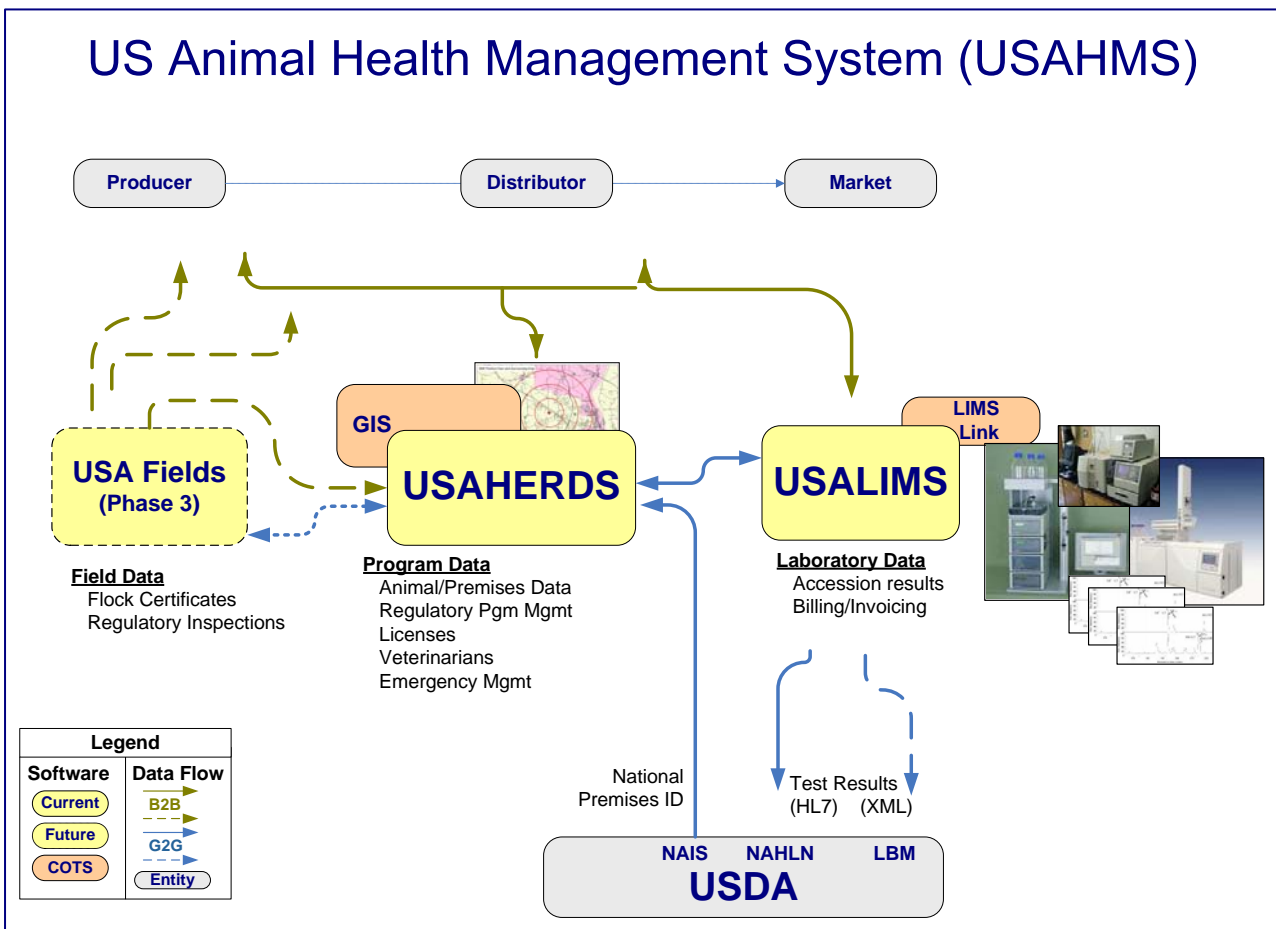
Component	Investment		
	PDA	Other States	Total
USAHERDS	\$600K	\$500K	\$1.1M
USALIMS	\$1,400K	\$900K	\$2.3M
	\$2M	\$1.4M	\$3.4M

The software and the Consortium represent an unprecedented synergy in the field of agriculture. Designed by and for the agriculture support staff, USAHMS is targeted for a highly specialized industry, with a clear vision for standards-based integration of data across the food chain, i.e., “from farm to fork.” It implements new and emerging protocols from USDA and DHS. It represents a horizontal collaboration in creating software for use across multiple states as well as a vertical collaboration in the business-to-government (B2G) food industry.

Finally, the development process represents a cross-boundary collaboration unique to the IT industry. In creating the software, the technical team utilized the Microsoft Solutions Framework (MSF), a set of software engineering processes and industry best practices that enable technical staff to leverage common architecture and development techniques at the coding level. This represents an industry-wide “collaboration” across the universe of Microsoft developers.

Description

An explosion of technology over the past decade left the PDA significantly behind in terms of appropriate use of technology, particularly in terms of monitoring the animal food chain and implementing infrastructure to contain emergency incidents, including bioterrorism. Given requirements to upgrade its aging technology in order to improve management of agriculture information, the PDA developed a long-term strategy of implementing its vision via incremental projects that align with a highly integrated, robustly architected enterprise system. By design it would feature support for not-yet-defined interfaces with USDA, using open architecture to enable easy implementation when the protocol is fully defined. The accompanying diagram provides an overview of the core components of the software, mirroring the life cycle of animal products in the food chain.



Implementing a strategic vision with relatively limited funding was a challenge. The first step was a central data repository accessible to the Commonwealth and to the animal laboratories at three locations in Pennsylvania. In 2004 PDA contracted with Computer Aid, Inc. (CAI) to design, develop, and implement the Pennsylvania Animal Health Emergency Reporting Diagnostic System (PAHERDS) using Microsoft .NET and Microsoft SQL Server. The project also included converting and merging legacy data from twenty-four different sources, representing thirty-five years of data on animal testing. PAHERDS provided stakeholders across Pennsylvania with a single source of information on animals, premises, veterinarians, and

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relevant data on regulated agricultural programs. CAI subsequently implemented the software, with several modifications, at Indiana BOAH (2005), ported them to the newly implemented KDA system (2006), and then retrofitted them into the PDA implementation (2006). In short although PDA funded the original base software, it also received enhancements nearly equal in value to its original investment, including:

- Structured Query Language Server Reporting Services (SSRS) for all reports
- Geographic Information Systems (GIS) Radius Report mapping
- Federal GDB reports to help feed federal systems,
- Stand-alone Web client for online Premises Registration with integration points into Herds
- Bio-surveillance Web site that collects syndromic and/or clinical signs of symptoms
- Advanced CVI & Import Permit tracking.

For the laboratory component, subsequently named USALIMS, the three agencies followed a practice of sharing an identical code base from the onset, thereby eliminating the cost of retrofitting. Any function built for one agency is immediately available to the others, and CAI coordinates requirements among members. Software upgrades are released several times a year, and no retrofitting is needed. The final “Fields” component is scheduled for design and development later this year. The accompanying timeline shows the genesis of the original components and their deployment in other states.¹

States	2004				2005				2006				2007				2008				
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	
Pennsylvania	HERDS				LIMS																Fields
Kentucky							HERDS			LIMS											
Indiana							HERDS														
S.Carolina																	LIMS				
W.Virginia																	LIMS				

Significance: How did the project improve the operation of government?

The USAHMS software integrates multiple technologies and physical devices at the farm, in the laboratory and at the office to provide a comprehensive, visual and highly accessible view of animal health. This information is a critical success factor for monitoring the food chain and mitigating risk associated with poison, outbreaks of animal diseases or bioterrorism. Integration includes GIS software to display occurrences of animal disease mapped across the state; real-time links to USDA; radio-frequency ID (RFID) software to expedite field inventory of animals; and LIMS-link software to enable lab equipment to input their test results directly into USAHMS. It represents a full business-to-business (B2B) model for the food industry while also implementing G2G integration between the state agency and appropriate federal entities.

The LIMS user interface follows normal workflow in a diagnostic laboratory, with the bulk of the interfaces directly related to accession (lab testing) support. Technical integration includes the following components:

¹ Note: The Plants component enables crop inspections in the field, using tablet PCs that synchronize with the central database; it is supplementary to the other animal-health.

- Real-time messaging to USDA, using Health Level Seven, Inc. (HL7) format
- Extensible markup language (XML) export of emergency reporting data
- Direct interface to commercial GIS software
- Direct input from lab equipment, using commercial LIMS-link software
- Support for RFID import/export
- Import/export to Microsoft Excel and other supported office products

By design USAHMS aligns with emerging standards from USDA and DHS. It specifically supports the animal/plant disease and food safety/security supply sections of Emergency Support Function (ESF) 11 of the National Response Framework (NRF).

Within the specialized field of agriculture information systems, the software is an industry leader. The designers are subject matter experts (SMEs) in their field, and the interfaces were designed with input from industry leaders across multiple state governments, specifically leveraging their experience with multiple USDA and DHS work groups. In some areas, the software is the first implementation of a new or emerging protocol.

Benefit of the Project: What does the organization give back to the public for the resources invested in IT projects?

All state agencies have experienced tremendous return on investment. Any member of the Consortium can obtain software at no cost other than implementation/configuration. This in turn enables new members such as South Carolina and West Virginia to obtain a \$2.3 million state-of-the-art LIMS system for approximately \$250K, i.e., a 90 percent savings.

Specifically for Pennsylvania, PDA received \$500,000 in enhancements to USAHERDS and \$900,000 in enhancements to USALIMS. It also split costs 50/50 on approximately \$40,000 in enhancements to USALIMS implemented in 2007. Future enhancements planned by the other members of the Consortium will result in commensurate savings.

As another metric, PDA invested \$2 million to protect a livestock/dairy industry valued at \$2.1 billion, representing nearly 7 percent of total U.S. production. This is a .1 percent investment in pro-active monitoring of animal health, and a significant risk-mitigation to the food supply chain.

The advantage to the public lies in highly accurate management of the agriculture industry within a state and across industry boundaries – at minimal cost to the organization. The initial investment PDA and the other members of the Consortium have implemented highly effective software specific for agriculture, with lowered costs to all parties and higher effectiveness in program management.