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United States
Department of
Agriculture

Office of the General Counsel
1400 Independence Ave. SW
Washington, DC 20250-1400

November 18, 2021

Delivered via Electronic Mail

**Re: Interim Response for Freedom of Information Act (FOIA)
Request No. 2022-DA-00100-F**

This is an interim response to the above-referenced FOIA request received by the U.S. Department of Agriculture (USDA), Office of Information Affairs (OIA). The request sought copies of certain records in the Office of the Chief Information Officer at USDA.

You recently agreed to modify your request concerning the USDA Target Architecture Plan 2018 by agreeing to accept the 2021 version of the USDA Target Architecture Plan.

Your request is being processed under the FOIA, 5 U.S.C. § 552.

A search for responsive records was conducted by the USDA Office of the Chief Information Officer (OCIO). Responsive records totaling seventy-two (72) pages were identified.

The OIA continues to process your request and will issue a final response.

You may seek dispute resolution services from the OIA's FOIA Public Liaison, Mr. Harald Fuller-Bennett. Mr. Fuller-Bennett may be contacted by telephone at 202-239-4522, or electronically at Harald.FullerBennett@usda.gov or USDAFOIA@usda.gov.

You also have the option to seek assistance from the Office of Government Information Services (OGIS). Please visit <https://www.archives.gov/ogis/mediation-program/request-assistance> for information about how to request OGIS assistance in relation to a FOIA request.

If you have any questions regarding the processing of this request, please contact Ms. Susan Ruppel at susan.ruppel@usda.gov or USDAFOIA@usda.gov.

For additional information regarding USDA FOIA regulations and processes, please refer to the information available online at [Freedom of Information Act Division | USDA](#).

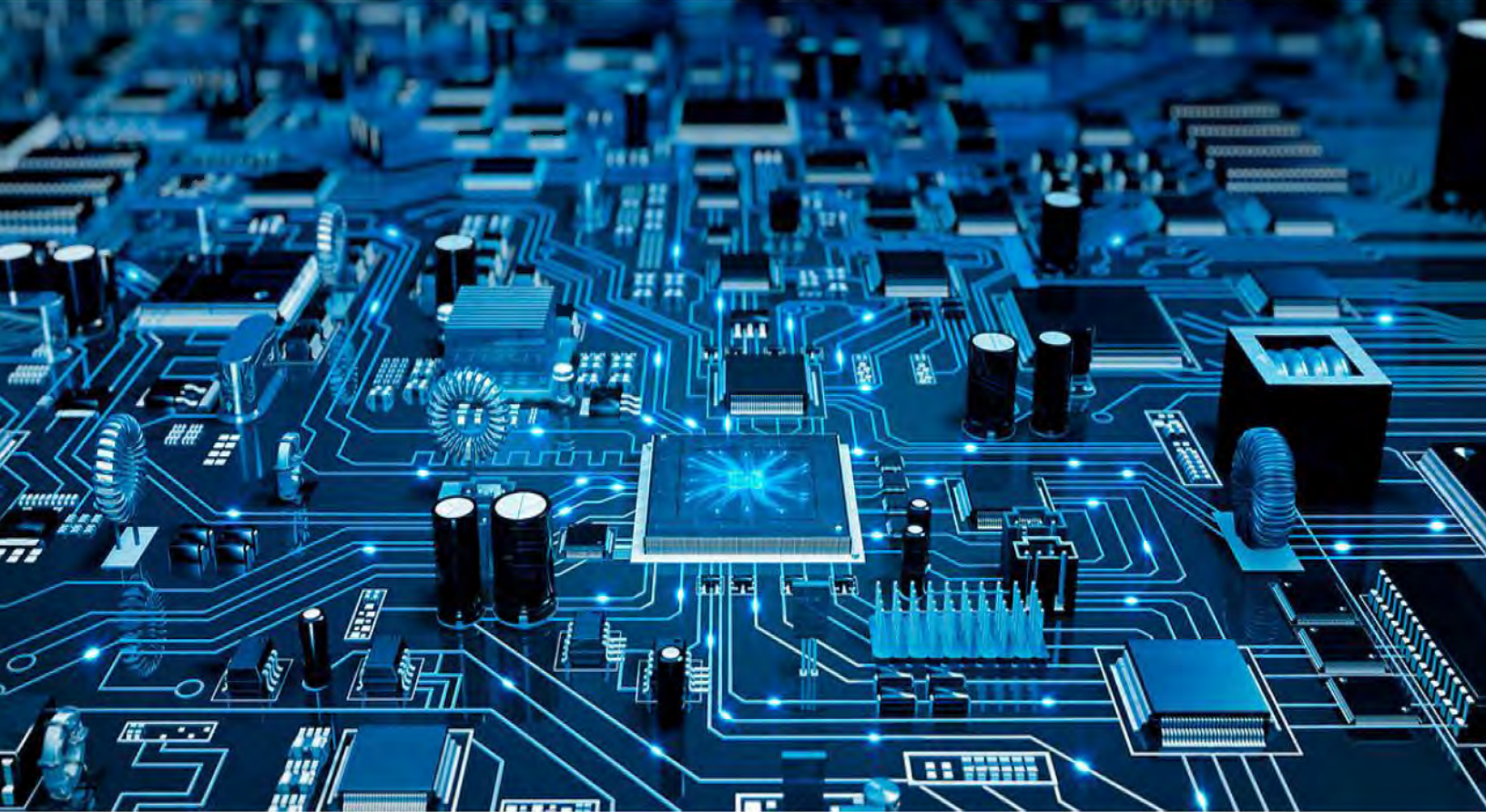
The OIA appreciates your patience as we continue processing the remainder of your FOIA request.

Sincerely,

Alexis R. Graves

Alexis R. Graves
Director
Office of Information Affairs

Enclosure: Responsive Records (72 pages)



Office of the Chief Information Officer - Target Architecture

Version 1.8.4: September 2021 (Final)

VERSION CONTROL

Version	Date	Contributor	Changes
0.8	11/05/18	Target Architecture Team	Initial Draft
0.9	11/14/18	Target Architecture Team	Pre-review version
1.0	11/30/18	Target Architecture Team	First Iteration to CIO
1.01	2/26/19	Target Architecture Team	Revisions and updates based on initial submittal
1.2	8/30/19	Target Architecture Team	Business Architecture updates and other revisions
1.6	2/14/20	Target Architecture Team	Reformat for As Is and To Be within FEAF Domains and other edits
1.7.3	8/21/20	Target Architecture Team	Performed comprehensive peer review and dispositioned comments
1.7.5	9/16/20	EA SME, Target Architecture Team	Performed comprehensive QA Review and dispositioned comments
1.7.6	10/19/20	EAC, OCIO, Target Architecture Team	Department review and then dispositioned comments
1.7.7	12/9/20	IRMC, CTO, Target Architecture Team	Management review and then dispositioned comments
1.7.8	1/28/21	IRMC, Target Architecture Team	IRMC Management review and then dispositioned comments
1.8.2	7/12/21	Target Architecture Team	Performed comprehensive update, and peer review, followed by QA Review; dispositioned comments
1.8.3	8/2/21	Target Architecture Team	Dispositioned EAC comments and suggested edits
1.8.4	9/10/21	IRMC, Target Architecture Team	IRMC Management review and then dispositioned comments.

TABLE OF CONTENTS

- INTRODUCTION
- EXECUTIVE SUMMARY
- BUSINESS ARCHITECTURE DOMAIN (SECTION 1.0)
- DATA ARCHITECTURE DOMAIN (SECTION 2.0)
- APPLICATION ARCHITECTURE DOMAIN (SECTION 3.0)
- INFRASTRUCTURE ARCHITECTURE DOMAIN (SECTION 4.0)
- SECURITY ARCHITECTURE DOMAIN (SECTION 5.0)
- ENTERPRISE ARCHITECTURE VISION ENVIRONMENT (EAVE) (SECTION 6.0)
- GOVERNANCE FOR EA ARCHITECTURES (SECTION 7.0)
- GLOSSARY
- APPENDIX A: REFERENCES
- APPENDIX B: ARTIFACTS
- APPENDIX C: MISSION AREA APPLICATION ROADMAPS AND SUPPORTING DOCUMENTATION
- APPENDIX D: INNOVATION & EMERGING TECHNOLOGY

INTRODUCTION

In 2019 the Chief Information Officer Gary Washington released the [United States Department of Agriculture's \(USDA\) Information Technology \(IT\) Strategic Plan](#) for fiscal years (FY) 2019 to 2022. It memorializes USDA's IT strategic goals and objectives in alignment with the overarching USDA Strategic plan and other relevant Executive direction such as the President's Management Agenda and Cross-Agency Priority Goals.

USDA seeks to be the most efficient, effective, and customer-focused Department in the Federal Government – this is in order to achieve its mission of providing leadership on agriculture, food, natural resources, rural development, nutrition, and related issues that are based on sound public policy, the best available science, and efficient management. USDA Office of the Chief Information Officer (OCIO) and mission area Assistant Chief Information Officers (ACIOs) serve the Department as strategic enablers of achieving that mission. The USDA OCIO delivers valuable infrastructure support services that enable responsive application and platform services from the distributed network of mission area ACIOs. USDA OCIO additionally provides a leadership role as steward of taxpayer funds, and to prepare the IT workforce for the innovation of today and tomorrow.



USDA has the privilege of serving as the lighthouse agency for the White House Office of American Innovation's IT Modernization initiative. The President's Management Agenda outlined modern IT as one of its drivers of transformation, stating that "modern IT must function as the backbone of how Government serves the public in the digital age. Meeting customer expectations, keeping sensitive data and systems secure, and ensuring responsive, multi-channel access to services are all critical parts of the vision for modern Government."

USDA's IT Modernization efforts change the way agriculture stakeholders engage and interact with important public programs, products and services, and fosters an innovative workforce culture involving strategic changes and alignments across the Department such as reducing the number of USDA CIOs from more than 20 to 1. USDA has been responsive to our customers while creating greater efficiencies across mission areas by reducing our more than 20 distributed Agency network IT support centers to 8 mission area ACIO support centers.

USDA has also been optimizing data center storage and strategic usage of that data going from 39 to 2 enterprise data centers, resulting in over \$61.3M cumulative savings over life of the Data Center Consolidation Initiative (DCOI) program (FY-2016 to FY-2020) and surpassing the Office of Management and Budget's (OMB) established DCOI goal for USDA by \$37.7M in cost savings. This accomplishment not only saved considerable dollars, but thanks to you we received an "A" on our recent Federal Information Technology Acquisition Reform Act (FITARA) scorecard under DCOI and increased our overall FITARA grade from a C+ to a B+. If you'd like to see how we are doing in other areas that make up the scorecard go to <https://fitara.meritalk.com/view/usda>.

USDA is also becoming a more data-driven organization through the facilitation and development of Department Chief Executive Officer and Mission Area dashboards to fully harness the power of USDA's impressive data set. USDA has also consolidated end-user support into a single organization at the Department level. As a result of the End User Consolidation (EUC) project conducted over 2 years, the OCIO Client Experience Center (CEC) went from supporting roughly 37,000 end user service customers to supporting approximately 102,000 customers. In the process, 442 new staff members were consolidated into OCIO. The EUC project was concluded at the end of October 2020. OCIO CEC continues to perform Technical Standardization Initiative work with many USDA agencies and mission areas, to continue to increase security, improve customer service, and drive cost savings across USDA.

USDA completed Phase II of its 2-year Centers of Excellence COEs initiative in 2019 in partnership with GSA and involving five COEs. These COEs played an essential role in establishing the USDA Target Architecture (TA) in November 2018 and played a vital role in subsequent updates. The OCIO has since restructured the COEs and absorbed them into the various USDA IT organizations. Figure 1 below provides an overview of each COE’s contributions.



Figure 1. USDA Centers of Excellence (Concluded in FY2020)

IPT	Description	Customer Impact
OCIO IT Workforce Plan	Scale workforce capacity and competency to think critically and creatively about complex problems	Scale workforce capacity and competency to think critically and creatively about complex problems
OCIO Data Analytics Dashboard	Build evidence-based decision capacity, traceability, and increase maturity of IT leadership decision-making practices	Enable IT leadership critical thinking and strategic, operational and tactical planning and management
Application Rationalization	Reframe and prioritize IT solutions by core business function and net productivity	Normalize data-driven, evidence-based IT portfolio investment
Robotic Process Automation (RPA) Service	Accelerate business process execution, increase accuracy, and release customer value	Enhance customer experience, and enable better use of resources
Industry Benchmarks and Service Optimization	Apply industry decision and best practices to IT service optimization, based on proven ideas	Identifies best fit solutions for diverse IT customer consumption, supply and governance responsibilities
Change Management and Customer Engagement	Enable effective reskilling and product and service relevancy by building professional capacity for solving new and complex problems	Enhance customer experience and deliver a consistent change management solution for prioritizing and executing transformational efforts

Table 1. One OCIO IT Modernization (FY20-21) – Initial IPT Initiatives

USDA continues to make great strides but there is still much to accomplish in achievement of the OCIO strategic mission and vision. Under the CIO’s leadership, and through the use of USDA’s Target Architecture, the USDA will continue to transform technology services to meet customers’ expectations, provide the greatest value, and support reskilling, growth, and professional development of our IT workforce.

EXECUTIVE SUMMARY

The United States Department of Agriculture (USDA) Target Architecture is informed by USDA's IT Strategic Plan (FY19-22) and facilitates achievement of the OCIO's strategic mission and vision. USDA's Target Architecture is a living document; it serves as a tool or method for the IT and business/mission functions of the Department to work in concert to ensure that business needs are addressed using the capabilities of IT most effectively. The target architecture is written in terms that resonate with the Business/Mission Areas and will be validated and approved by key stakeholders within the USDA.

The purpose of the USDA Target Architecture is to ensure the Business/Mission requirements and IT infrastructure work in sync to meet Department and Mission Area (MA) objectives. For example, the target architecture includes use of drone technology across Mission Areas. Drone technology is part of farming's high-tech partnership, providing new ways of increasing crop yields through in-depth field analysis, long-distance crop spraying, and high-efficiency crop monitoring. The Target Architecture provides the details that describes the desired future state architecture to support the organization's strategic priorities. The Department and Mission Areas' strategic business plans are essential and play a critical role in a developing the target architecture. The USDA Enterprise Architect incorporates the Department and Mission Areas' strategic business plans into the target architecture which is essential to the universal IT infrastructure of USDA.

The Target Architecture is used to set the technology framework needed for USDA to meet its business/mission requirements and service objectives. This Target Architecture is being written in iterations by prioritizing business tasks based on the urgency of the mission needs. USDA uses the Target Architecture to guide the business process/requirements to reach its target state through each architecture domain (business, data, application, infrastructure, and security).

The Target Architecture is used as a resource by IT Modernization efforts to provide guidance in technology direction.

Target Architecture Approach

Focusing the Target Architecture of the Department through Enterprise Architecture (EA) lenses is an approach for bridging the gaps between the mission, business, data, process, and technology perspectives necessary to develop a holistic strategy most beneficial to USDA and external customers. Collaboration with key stakeholders and Subject Matter Experts (SMEs) within each architectural domain ensures that the Target Architecture improves and focuses on delivering USDA's business capabilities through the dissemination of valuable information in service to customers seeking assistance within Mission Areas (MAs).

As a highly federated Department, USDA's Target Architecture serves as overall guidance to USDA's MAs, Lines of Business, and/or Products to create their own specific Segment Architectures. Segment Architectures further elaborate the Target Architecture by detailing the target architecture and roadmap to achieve the specific business objectives. A federated approach to EA speeds up the organization's adoption of EA and allows for variations in business specific architectures, within agreed upon guidelines. Governance processes ensure continual alignment with these guidelines and provide a process in which to introduce changes.

As shown in Figure 2, USDA uses the Federal EA Framework's (FEAF) defined domains (Business, Data, Application, Infrastructure, and Security) to describe the current state and target state for each domain. Transition strategies and transformational road mapping techniques are used to organize, plan, facilitate, implement, and measure the progress towards the target state. Mission Area strategies are within Segment Architectures, which are elaborations of the USDA TA. Summaries of Segment Architectures within the USDA TA help to describe the federated USDA EA.

EA modelling tools and repositories (such as the Department’s Enterprise Architecture Vision Environment (EAVE)) and portfolio management systems (such as the Department’s Agriculture Maximum (AgMax) Portfolio Management system) support the architecture modeling, portfolio analysis, and transition planning to the future state.

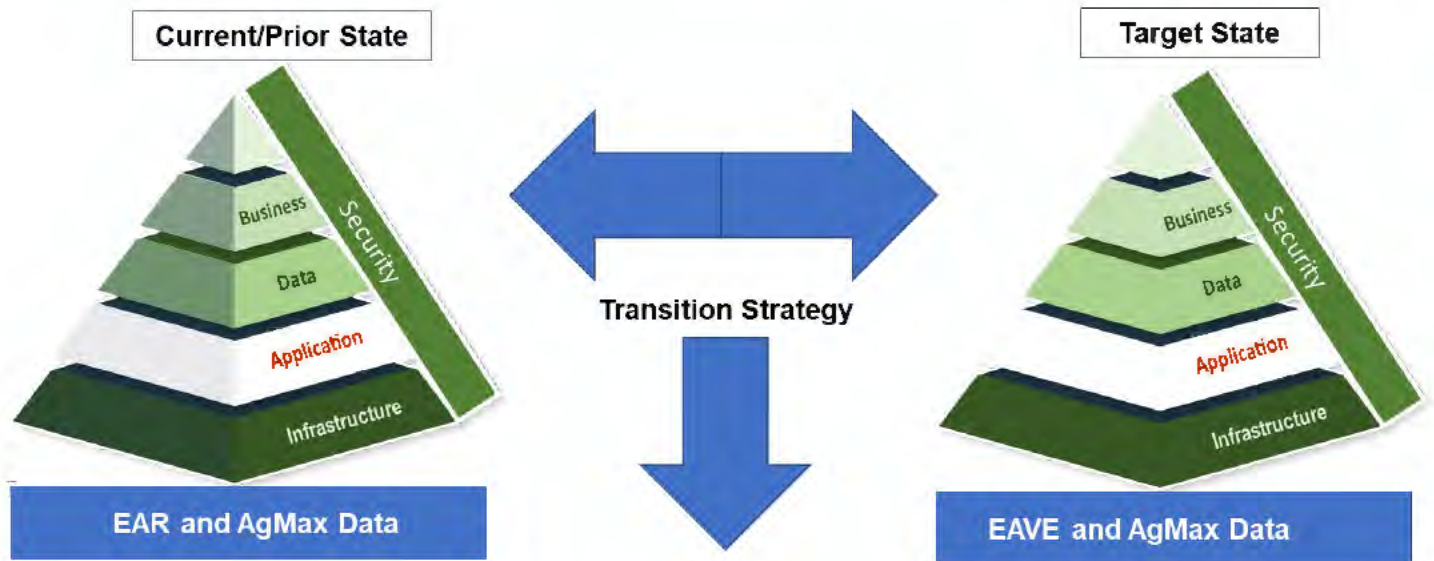


Figure 2. Target Architecture Approach

The Target Architecture identifies the relationships, dependencies, and common patterns between the business vision (business architecture) and authoritative information (data architecture), application services (application architecture), and platform/network/facility technologies (infrastructure architecture) employed by the department. When fully optimized for decision-making, the Target Architecture provides the guiding principles to translate Department-wide strategic plans into actionable organization implementation practices with well-articulated Enterprise and Segment Architecture domain strategies, direction, and planning.

The ideation, design, development, and codification of the USDA Target Architecture is performed collaboratively with all stakeholders, and in direct conjunction with the Department Chief Technology Officer (CTO) and Chief Data Officer (CDO), among other key leaders. The USDA Target Architecture serves as the core artifact that consolidates MA, OCIO, CTO, CDO, Chief Scientist, and other cross-functional architecture recommendations, and enables deployment of unifying solution architecture principles and practices, which lead to agile, extensible IT, produce cost savings and avoidance through reuse of IT, and result in elimination of obsolete legacy IT. The Target Architecture is detailed realtime in EAVE for Department-wide reference and use, and shall be updated two times a year to ensure new and emerging IT is properly represented.

A description and status for each architecture domain is summarized below:

Architecture Domain	Description	Status
Business	<i>The Business Architecture domain describes “what we do” within the Federal enterprise through the definition of outcome-oriented and measurable functions and services.</i>	<i>The USDA Business Capabilities Level 1 model has been further defined to Level 2 and lower. Progress continues in defining and maturing associated USDA Governing Bodies and the common Knowledgebase as well.</i>
Data	<i>The Data Architecture domain and its associated elements refers to the processes and methodologies that address data at rest, data in motion, data sets, and how these relate to data dependent processes and applications across the Federal Government.</i>	<i>In support of informed decisions that are fact-based, and data driven, two main data-driven projects are progressing: The Data Lake and Data Driven Analytics. USDA has begun defining the Data Domain within EAVE.</i>

Architecture Domain	Description	Status
Application	<i>The Application Architecture domain defines USDA's application systems that are necessary to process data and support the mission, business, and user requirements.</i>	<i>In support of an enterprise Application Rationalization initiative, Application Inventories for all MAs are being loaded and validated into EAVE, including Critical Attributes, and mapped to Business Capabilities. For the Secretary's data call, as of 30JUN2021, 297 IT Assets have projected Decommissioning dates and 19 have preliminarily been identified as redundant.</i>
Infrastructure	<i>The Infrastructure Architecture domain is the taxonomy-based reference model that categorizes USDA's IT infrastructure and the facilities and network that hosts the IT infrastructure.</i>	<i>OCIO provides most of the infrastructure to USDA. Progress is being made in all areas: Datacenter Optimization; Cloud Platform Services; Mobile Technology Strategy; Network Modernization; End User Consolidation; and Telecommunications Broadband. Digital Infrastructure Services Center (DISC) publishes an annual report related to enterprise infrastructure (last version was for FY 2019). Additionally, a Standards Profile Baseline is updated Annually. The Infrastructure Domain data is targeted to be loaded to EAVE by FY21/Q4 and the Standards Profile by FY22/Q1.</i>
Security	<i>The Security Architecture domain uses information security and privacy standards to create a uniform security model through three areas: Purpose, Risk, and Controls. The Security Model is integrated into all of the EA architectures/domains and provides a mechanism for communicating information that is relevant to making decisions affecting each domain.</i>	<i>The Information Security Committee is targeting to centralize cybersecurity functions and capabilities to eliminate duplicity, fragmentation, and to capitalize on the economies of scale. Those functions and capabilities include the following:</i> <ul style="list-style-type: none"> • <i>Centralizing OCIO security operations to align with National Institute of Standards and Technology Cybersecurity Framework</i> • <i>Cultivating a high performing cyber workforce</i> • <i>Shifting the paradigm to business driven and customer-centric service delivery</i> • <i>Striking a balance between cybersecurity risks and business requirements</i> • <i>Identification, protection and recovery of functions so Mission Areas can focus on mission objectives and secure technology delivery</i> • <i>Operationalizing scorecards and metrics</i>

Table 2. Summary Description and Status for Each Architecture Domain

Architecture components are subordinate to the overarching USDA Business Architecture, thereby producing a business-driven architecture. The Target Architecture is developed by essential functional capabilities, prioritized, first, to align solutions to enact the USDA IT Strategic Plan strategic goals and objectives, which deliver core business capabilities, and second, ordered in conjunction with MA strategic initiatives necessary to deliver more specialized, custom, and boutique customer products and services that utilize enterprise applications APIs and platforms.

How to use the Target Architecture

The USDA Target Architecture serves as a reference for stakeholders to understand **what** information and technology the USDA currently uses to support the business, **how** it is deployed, and what is **desired or recommended** for future efforts. As organizations embark on a Segment Architecture design, an analysis or major initiative, the Target Architecture provides guidance for common questions, such as, where similar business capabilities may exist, what applications support them, and what software-as-a-service options are available to use. This document is not meant to be exhaustive, but rather provide organizational context and the location of where to find the next level of detail. As the EA Repository (EAVE) is populated, it then serves as the most up-to-date detailed information and alignment amongst architectural layers.

BUSINESS ARCHITECTURE DOMAIN (Section 1.0)

1.1 Overview

The Business Architecture (BA) domain, and through its associated elements (Figure 4), is a key part in delivering expected outcomes and business value to an organization. This domain can be used to describe the type of business functions at the system, segment, agency, sector, Federal, national, or international levels. Also, the identified business functions and services can be used as a baseline between the Executive area, department, and Agencies and Staff Offices with external partners. Using standard business functions and services across the department to classify the business mission and goals, is useful in identifying opportunities in the following areas: cost reduction; shared services; solution re-use; and intra- and inter-agency collaboration.



Figure 3. The Business Architecture Layer in Relation to Enterprise Architecture.

The BA domain provides a functional perspective of the department, including its internal operations. By describing the department using standard business functions and services rather than an organizational perspective, this domain can promote cross government collaboration (e.g., Office of Management and Budget). This enables business and IT leaders to discover opportunities for cost savings and new business capabilities that help achieve strategic objectives. The Business Architecture domain describes “what we do” within the Federal enterprise through the definition of outcome-oriented and measurable functions and services. This domain provides a standardized way of classifying USDA operations. The true utility and value are realized when domain details are effectively used in business analysis and help improve the performance of a department.

1.2 Business Capabilities

Business capabilities are functional building blocks of business architecture and support both the business model and the business strategy. They describe the organization’s ability to perform unique business activities. In addition, business capabilities of an enterprise are defined and are organized into a business capability map. This business capability map is a basis for analyzing how an IT landscape can be transformed to optimally support the business. This optimization enables the assessment of capabilities and supports the identification and communication of EA and Business demands.

1.2.1 Current State

The BA team leverages the Business Architect Body of Knowledge (BIZBOK) best practices to set up and mature the existing business architecture at USDA. Note that Figure 4 below is a visual depiction of the Business Architecture components.

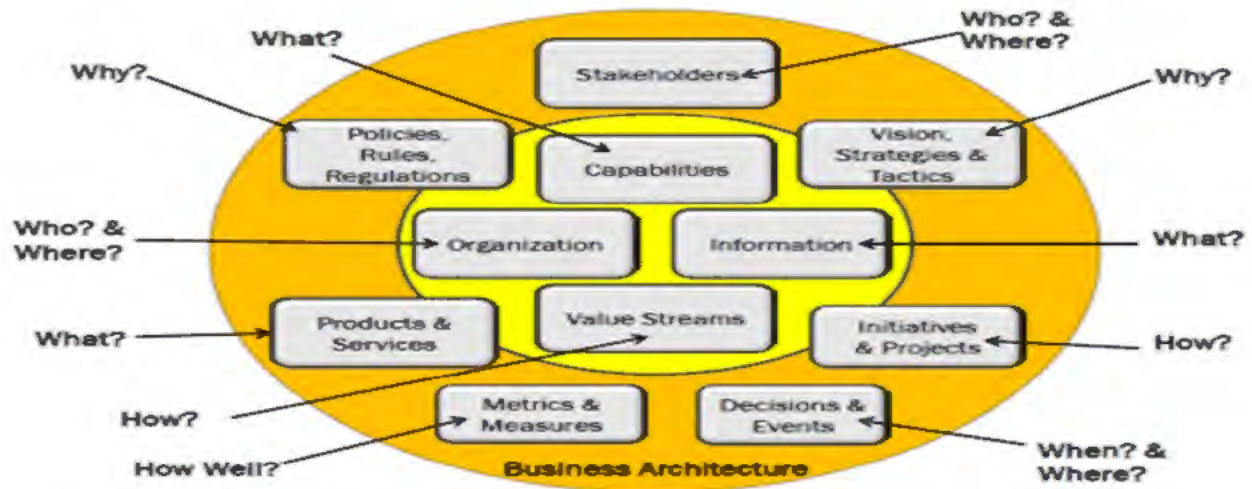


Figure 4. Components of Business Architecture

The Enterprise Architecture Division (EAD) team has worked closely with representatives from Mission Areas, Agencies, and participating staff offices to identify and define USDA Level 1 Business Capabilities. The USDA Level 1 Business Capabilities are decomposed into 3 Tiers: Strategic, Core and Supporting. The Strategic Tier includes capabilities that reflect executive focal points. The Core Tier relates to the heart of what USDA does within its Mission areas and Agencies. The Supporting Tier represents the capabilities that don't directly relate to the business of USDA but are necessary to function as an organization.

Figure 5: The USDA Level 1 Business Capabilities visual below displays the current state USDA Level 1 Business Capabilities and its Tiers.

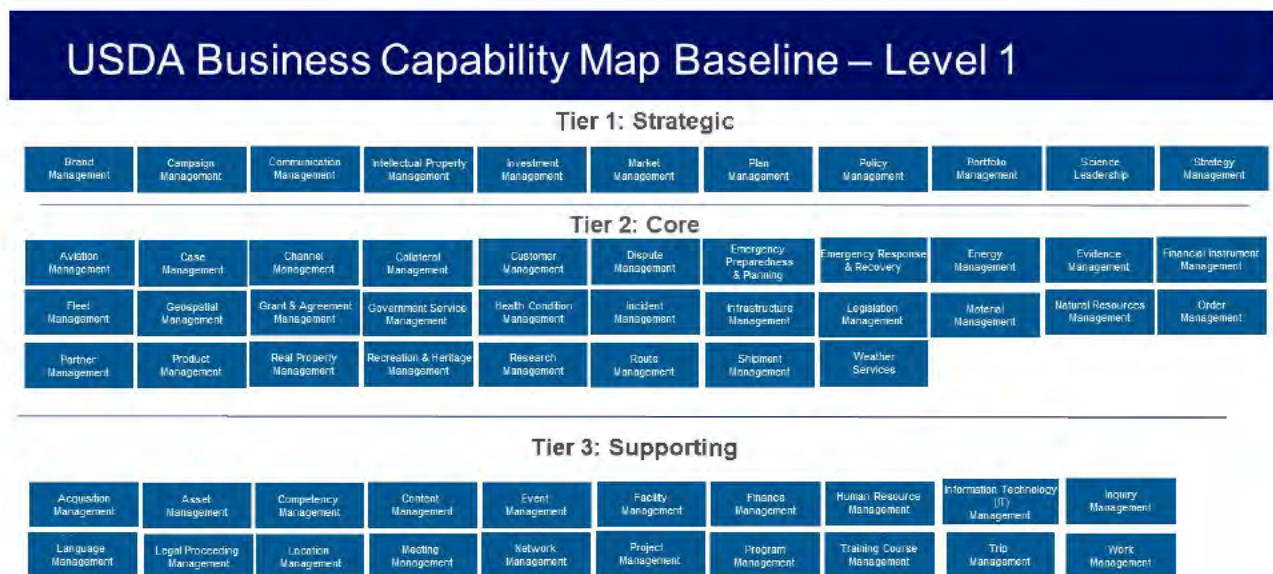


Figure 5. Current L1 USDA Business Capabilities – May 2021

EAD adopted and leveraged Industry Reference Business Capability Models, where appropriate. This facilitated the standardization of USDA's business capabilities and baselined them to Level 3 (Level 4 in some cases). Currently, there are a total of 797 business capabilities in the USDA baseline which can be found here: [2021 USDA Business Capabilities Baseline](#).

[Industry Reference Business Capability Models](#) can be utilized to identify strategic focus areas by mapping strategies, scorecards, and/or executive priorities to the business capabilities. Current capability performance and maturity level can be assessed through industry benchmarking or by assessing pain points and improvement opportunities.

Industry Reference Business Capability Models can also be used to highlight capability gaps, current application support, and future solution options. They also provide a common, shared definition for both business and technology professionals to: discuss information- and systems-related issues; include investment priorities; and facilitate applications/systems enablement of the organization's strategic direction.

1.2.2 Target State

In support of the USDA Secretary and Undersecretary's recent June 2021 request related to legacy systems, EAD has been working with MA and Agency business stakeholders to validate their candidate set of relevant business capabilities and to provide business context insight. Also, EAD has been using business capability mapping to identify redundant systems for application rationalization (AppRat). In addition, EAD continues to provide MA and Agencies with business capability mapping mentorship in EAVE.

Figure 6: The Business Capabilities Mapping in EAVE visual below displays how an IT application (blue) are related/ mapped to several business capabilities (yellow) in EAVE.

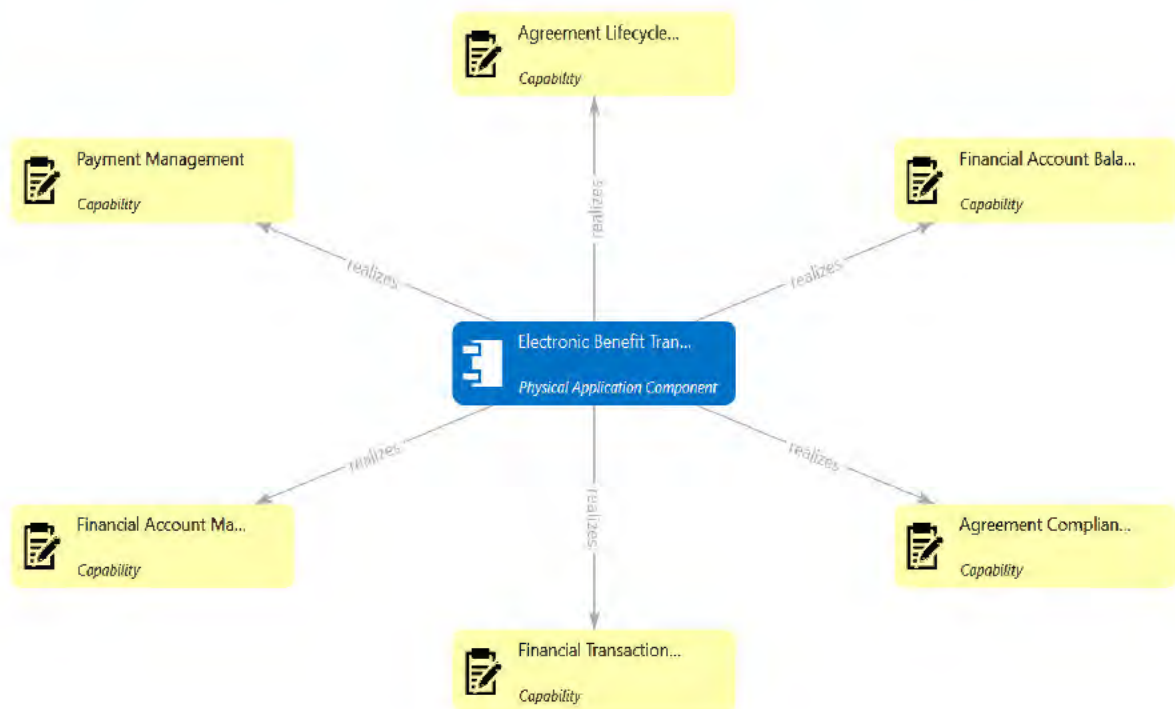


Figure 6. Sample – IT Application to Business Capabilities Relationship Mapping in EAVE

DATA ARCHITECTURE DOMAIN (Section 2.0)

2.1 Overview

The Data Architecture domain and its associated elements refers to the processes and methodologies that address data at rest, data in motion, data sets, and how these relate to data dependent processes and applications across the Federal Government. It includes the primary data entities, data types, and sources that are essential to USDA in its data sourcing and management needs. Data Architecture consists of three different layers of processes, all coming together to promote the streamlining of data within USDA and the Federal Government. It conceptualizes a data model that includes all data entities within it; this is aided by the system model that defines how data entities are linked, and in turn is illustrated via a logical data model. Technology models are then used that provide the data mechanism for each specific USDA process and functionality, including how the actual data architecture is implemented on underlying technology infrastructure.



Figure 7. The Data Architecture Layer in Relation to Enterprise Architecture.

In practice, USDA has established a Chief Data Officer (CDO), who must ensure that USDA makes informed decisions that are fact-based, and data driven. Through this leadership, heavy investment and expansion on two main data-driven projects have flourished within the department: The Data Lake and Data Driven Analytics.

2.2 Enterprise Data Model

The information owned by USDA is wide-ranging from science and technology to specific commodities (e.g. grain, fuel). At the highest level, the Conceptual Data Model (CDM) defines what type of data is used within USDA; this model is typically created by business stakeholders and data architects. The purpose is to organize, scope, and define business concepts and rules. This Target Architecture will describe USDA's data at this level.

The CDM provides a technology agnostic set of "subject areas" which are grouped into similar sets of data "entities." Data typically only changes when there are changes in the mission and/or business functions. Therefore, the current and target state of the USDA Enterprise Data is the same. There would be a need for a current state, target state, and transition plan if the business changes; for example, if moving the human resource function from USDA to OPM. The USDA Enterprise Data Model is depicted in Figure 8 below.

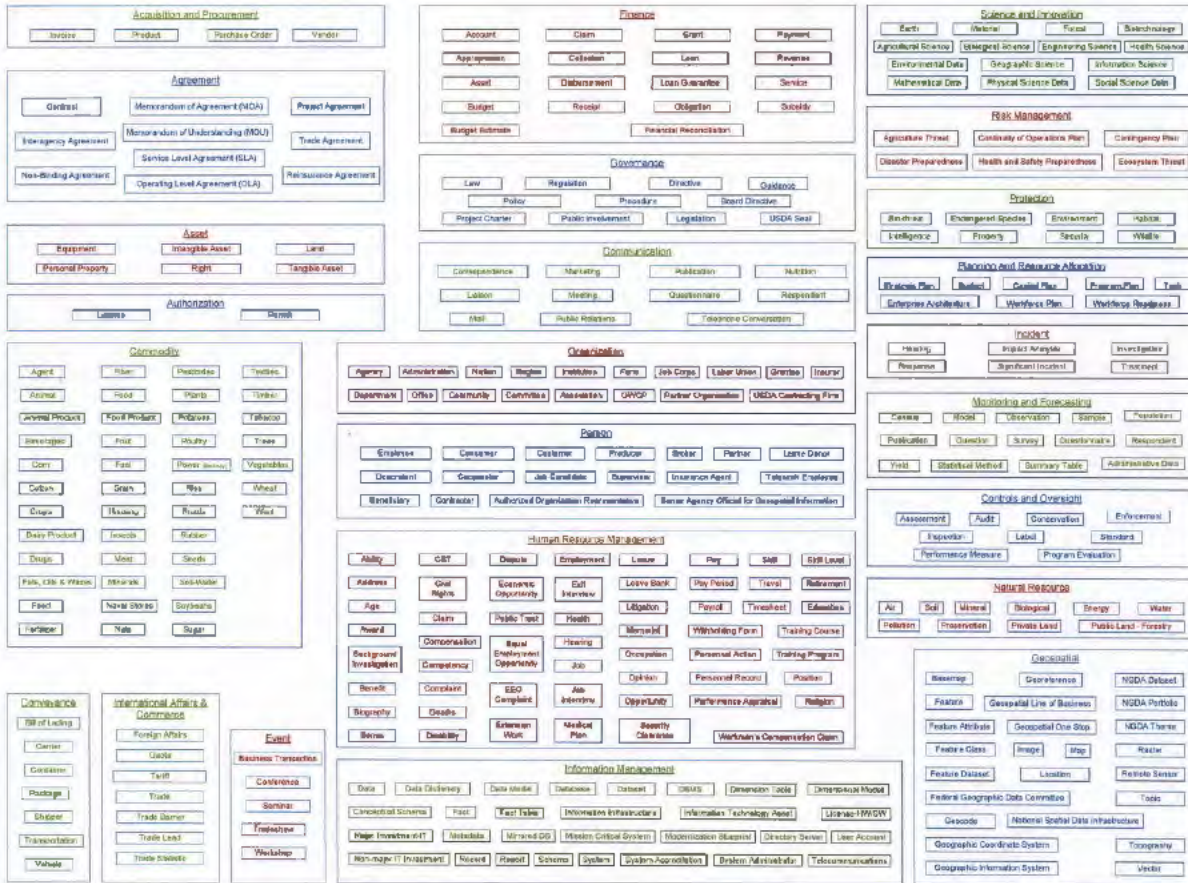


Figure 8. USDA Enterprise Data Model [see embedded file below for larger view]

You can also view the above image in a larger view in the following embedded file:



In conjunction with the Business Architecture de-composition, a more detailed Logical Data Model (LDM) may be created to define how the data interacts together within a business area. This is not within the scope of this Target Architecture.

2.3 Data Management and Analytics

Data Management, as defined by USDA, lays the foundation for information systems. It provides managers with the leading edge for decision-making and better, more timely service to the customer. Data Management includes:

- Development and coordination of policies, procedures and standards for the management of data;
- Development of strategic and tactical plans, including that the data architecture be driven by business processes;
- Development of performance measures;
- Administration of databases;
- Administration of training programs beginning with data management awareness and involving highly technical subject matter;

Data Management and Analytics promote a healthy sharing of data throughout the Department. It ensures that data collected and disseminated meet programmatic, privacy, security, and oversight requirements, particularly in sharing and reuse of data between agencies. This allows management decision-making to be leveraged by providing better access to more accurate and timely data. Keeping business-driven processes in the forefront, Data Management avoids the cost of redundant data collection. This ensures acquisitions related to data management are carried out efficiently in terms of cost, need, and use throughout USDA.

The following sections will explore where USDA is currently, and where USDA is targeting the state of Data Management and Analytics moving forward.

2.3.1 Current State

USDA is committed to becoming a Data-Driven organization as it faces several key challenges. Please see the challenges below:

- Authoritative sources of data are not clear;
- Data is scattered across agencies (including functions) and lacks standardization;
- Lack of access to analytical tools supporting rapid and well-informed decisions;
- Decisions are frequently made with outdated or limited information

Figure 9: Data Analytics Guiding Principles figure below establishes data analytics as the guiding principle for the future of analytics in USDA.

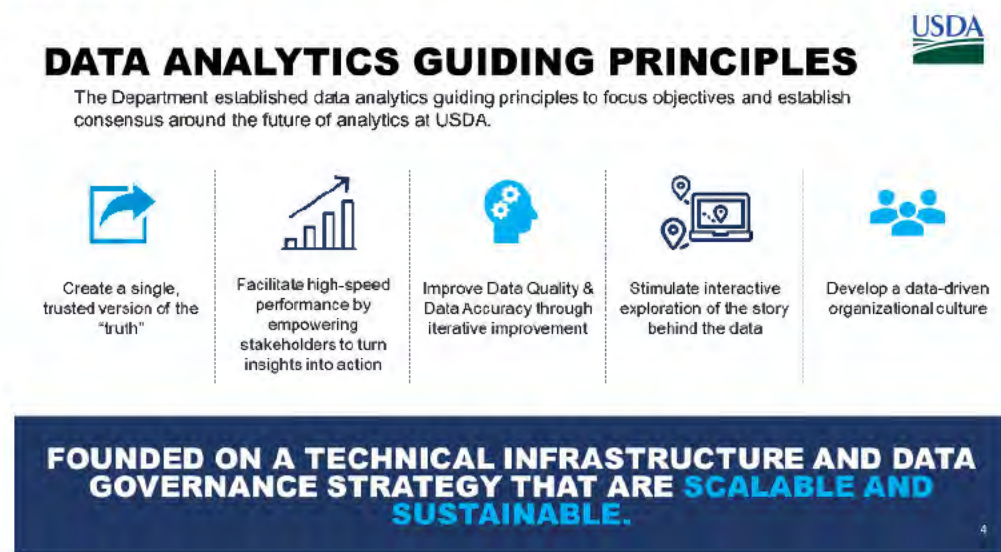


Figure 9. Data Analytics Guiding Principles

In 2018, USDA set an Agency Priority Goal to modernize IT and data analytics across the Department. This resulted in a USDA that is customer-focused, evidence-based, and efficient in the use of American taxpayer's dollars. USDA accomplished this by developing dashboards, using an enterprise analytics platform of key administrative data used across USDA for situational awareness and decision making. An expansion of this effort occurred in 2019 to incorporate business program data from across USDA's nine mission areas. The result is an enterprise analytics platform that supports more advanced data analytics. This includes predictive modeling, AI and machine learning, self-service access to data, cross-mission area data sharing, big data analytics including precision agriculture, and geospatial analytics.

The CDO has established an Enterprise Data Governance Structure to manage USDA's data as strategic asset as noted below in Section 7.3 (Data Architecture Governance).

The Enterprise Data Analytics Platform and Toolset (EDAPT), better known as the Data Lake, is a cloud based, managed platform established within the USDA security boundary and connected to the rest of the USDA network through Netbond. USDA has stood up the Data Lake which will facilitate data sharing across all of USDA

as data streams from all Mission Areas, agencies, and staff offices that contribute to the repository. Seen in Figures 10 and 11, the platform supports data storage, visualization, and analytics using a set of tools such as Cloudera, Tableau, Python, and R. Data from source systems and from public sources comes through the USDA network and Netbond to the USDA Enterprise Analytics platform. The Data Lake consolidates all previous data storages at USDA into a single source allowing agencies to leverage industry-leading analytics tools in an environment that is secure, flexible, and integrated across the enterprise.



DATA LAKE HIGH LEVEL OVERVIEW

USDA's Data Lake offers agencies the opportunity to leverage industry-leading analytics tools in an environment that is secure, flexible, and integrated across the enterprise.

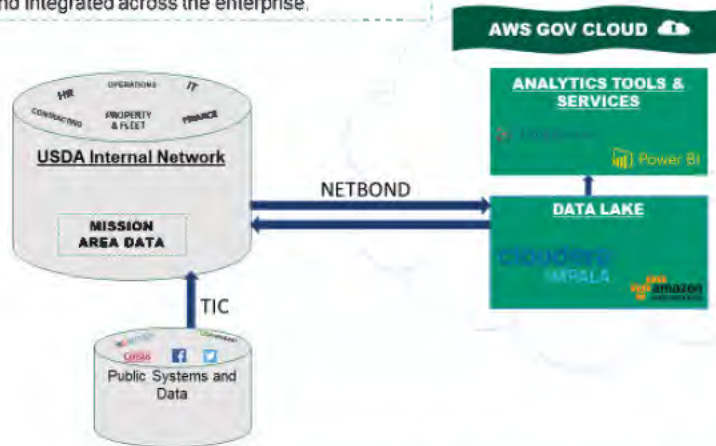


Figure 10. Data Lake High Level Overview

USDA's cloud data analytics service provides industry-leading analytics tools in an environment that is secure, flexible, and integrated across the enterprise.



DATA LAKE COMPONENTS

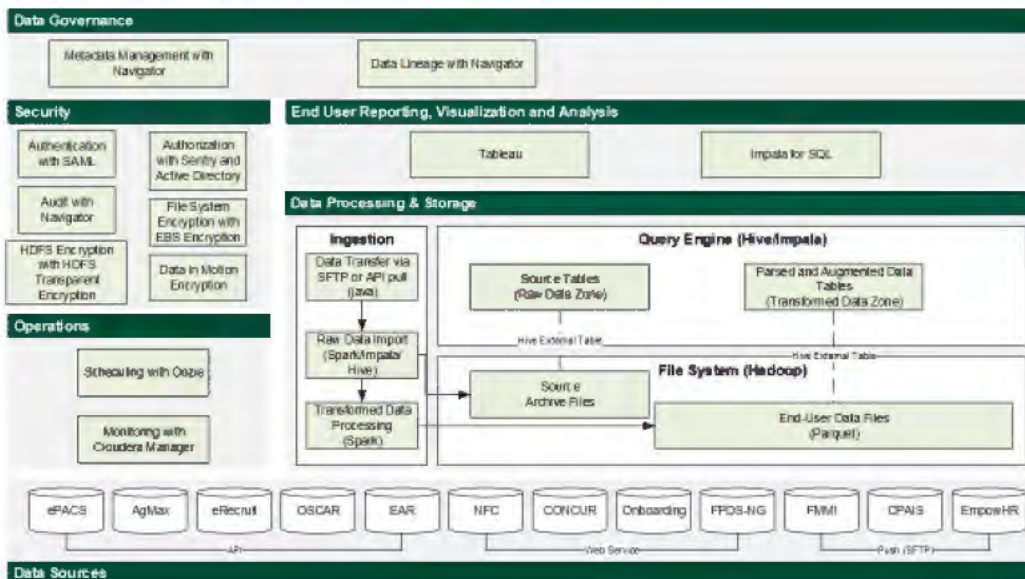


Figure 11. Data Lake Components

This June 2021 video highlights what EDAPT (Data Lake) is, the role EDAPT plays in USDA's Data Strategy, and

what USDA has achieved with EDAPT to date with data visualization, analytics, and delivering data to the public. Watch the [EDAPT video](#) to learn more.

USDA completed a department-wide data management maturity assessment to evaluate USDA's current data management capabilities. This spanned several categories: Data Management Strategy; Data Governance; Data Quality; Data Management Operations, Platform, and Architecture; and Supporting Processes. The result is to establish a baseline of data management maturity, addressing a key goal of the Federal Data Strategy. The maturity assessment also led to identify areas within USDA where areas of strength exist and can be leveraged by other parts of the organization. USDA can use this information to develop strategies and roadmaps for improving systems, data quality, and data governance across the organization.

2.3.2 Target State

Per the office of the CDO, necessary steps need to be taken to ensure the proliferation of Data Architecture moving forward. There is a necessity to expand the size of the data lake from the current two-terabyte size, to accommodate the growing use of analytics in years to come. Due to ever-increasing emphasis being put on analytics, necessary steps are to be implemented for Data Architecture to maintain steady growth.

Benefits of Cloud Data Analytics Platform: Continued Expansion of Data Lake

Analytical tools will be the driving focus for Data Management and Analytics in years to come. To promote this focus, analytical tools need to be standardized and modernized constantly. This will require an increased speed of implementation for analytics tools. The ATO process is frequently over 180 days for new analytics applications and it is imperative moving forward to avoid this time consumption for implementation.

In addition to increasing implementation speed, there is a need to reduce licensing costs moving forward. USDA needs to capitalize on the use of enterprise licensing and to centralize core administrative activities to achieve cost savings. USDA was able to reduce the Tableau license cost from 10-40 percent with an enterprise license agreement. There will be major cost savings that USDA will be able to achieve if enterprise licensing is standardized throughout the Department.

Business-driven initiatives are necessary in other respects of Data Architecture. There is a need to improve staff efficiency to elevate impact. Using the Enterprise Service Bus seen later in Figure 13 (Future USDA Analytics Environment), the collaborative effort in aggregating this data can be worth an estimated \$300k of savings in the first fiscal year alone. This can only be achieved through collaboration, emphasizing the need to enable One USDA strategic insights. Deeper and broader insights need to be brought together from different parts of USDA (e.g. farmer data that exists in multiple agencies) to drive these cost-saving initiatives.

USDA's platform needs to be reevaluated moving forward. There is a need to establish a platform that in the future can support more secure data enclaves as well as more public access to USDA data. From there, USDA can leverage a scalable platform to support big data initiatives that have been challenging to implement historically. CY21 timelines are presented in Figure 12: Objectives for Data Analytics below.



Data Analytics

Objective: Deliver data analytics tools that improve USDA decision-making as a "Facts Based, Data Driven, and Customer-Focused Organization"

Achievements to Date

- ✓ Developed full suite of 25 FPAC dashboards and developed 10 RD prototype dashboards
- ✓ Improved disaster response for FPAC customers

What will be achieved in 3 months?

- Deploy the FPAC and RD Dashboards, providing real-time insights to the Mission Area employees to better serve their customers
- Initiate and complete NRE and FNS Dashboards

What will be achieved in 6 months?

- Deploy NRE and FNS dashboards
- Initiate, complete and operationalize the MRP and TFAA Dashboards
- Initiate REE and FSIS Dashboards



6

Figure 12. Objectives for Data Analytics

Data Analytics provides USDA leadership with the data tools necessary to make rapid and data-driven decisions in real-time. The data tools will provide information that enable leadership to monitor and meet program goals, communicate progress, identify challenges, and address strengths, threats, and opportunities. Tableau has been identified as the primary data analytics tool for use within USDA.

USDA’s draft Analytics target state environment is shown below in Figure 13: Future USDA Analytics Environment.

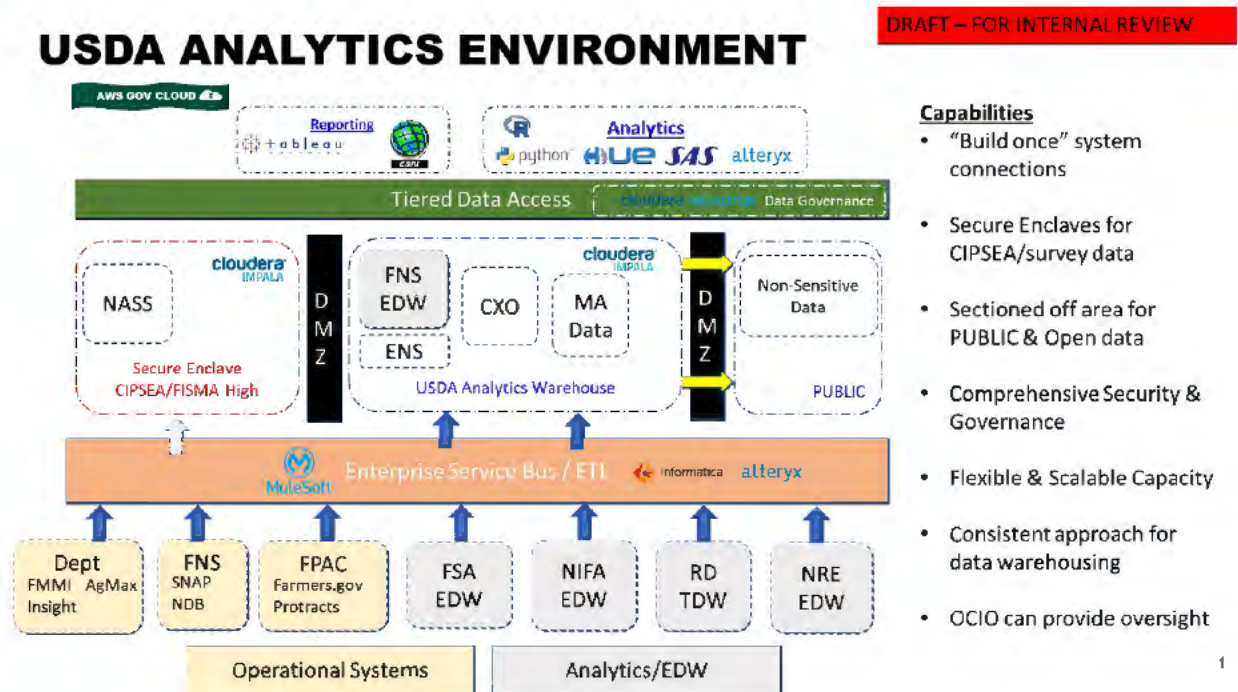


Figure 13. Future USDA Analytics Environment

APPLICATION ARCHITECTURE DOMAIN (Section 3.0)

3.1 Overview

The application architecture defines USDA's application systems that are necessary to process data and support the mission, business, and user requirements. This architecture is focused on the data consumed and produced by applications; the impact of the applications within USDA are depicted by mappings to business capabilities, investments, and infrastructure. The application architecture is also used to guide the suite of applications being used by USDA is scalable, reliable, available, and manageable.



Figure 14. The Application Architecture Layer in Relation to Enterprise Architecture

3.2 USDA IT Assets

An IT asset is any agency-owned software or hardware that is used in the course of business activities and within an information technology environment. IT assets are integral components of the organization's systems and network infrastructure.

Tracking of IT assets within an IT Asset Management repository such as EAVE (see Section 6.1 for EAVE details) is imperative to the operational and/or financial success of an enterprise. The term "IT assets" herein is defined as software components (including applications, websites, databases, email, and other supporting software) residing on an infrastructure that may be used to create, use, share, and store data and information to enable support of USDA's business function(s).

3.2.2 Current State

Through a targeted effort over the last two years, the Department has inventoried the IT assets across the enterprise through interfaces with AgMax and manual data calls. The Department currently has 2,156 IT assets within the USDA portfolio. A process to continuously update these assets and associated attributes has also been defined to reflect the current initiatives and scope. The IT assets serve as the consolidated source for USDA IT asset inventory. The USDA IT assets are used to support the identification of opportunities for sharing, re-use and consolidation and/or renegotiation of licenses. To achieve additional value for USDA, the Department EA team, in conjunction with stakeholders, need to identify opportunities for re-use and consolidation. This objective will be achieved through the Application rationalization process.

Application rationalization is the process of streamlining the application portfolio with an explicit goal of improving efficiency to align with business needs, reduce complexity and decrease costs. This may be part of the Department, a Mission Area, Product Line, or Segment application strategy. There are five high level steps that guide the 'App Rat' process:

1. Retire aging and low-value applications
2. Modernize aging and high-value applications
3. Eliminate redundant applications
4. Standardize common technology platforms and versions
5. Consolidate applications; physically, logically, or both

3.2.2 Future State

Portfolio Management techniques are used to support application functionality consolidation. This is executed by analyzing the mappings to the Application Reference Model with the associated lifecycle information. For example, when a vendor no longer supports an aging version of its software product. These techniques are an integral part of the entire lifecycle of IT assets; including budgeting, acquisition, and the goal to improve acquisition outcomes.

Geospatial assets and the accompanying data have been identified by the application rationalization team as a

first priority, and EAVE will be used to pilot AppRat for Geospatial assets. The goal of this pilot is to identify duplicative assets and the cost savings that can be achieved by analyzing departmental data populated in this tool by Mission Area and Agency stakeholders. Geospatial information is critical to USDA because the mission of the Department is directly tied to the land, and the information collected, analyzed, and used to make informed business decisions for the American people.

The processes and templates developed as an output of the Geospatial Application Rationalization pilot will be provided to application portfolio teams to use in their own the AppRat efforts.

Please see Appendix C: Mission Area Application Roadmaps for details of the strategies and plans for each Mission Area to rationalize, modernize and/or manage their application portfolios.

3.3 USDA Decommissioned (retired) IT Assets

Decommissioning (retired) IT assets is a process by which a business application (or system) is removed from use in an organization. Decommissioning requires identification the data, analysis of the data in the system, meta-data and system documentation. Data elements that are deemed critical must be retained and/or proceed through an accountable process for deletion of residual data in the system.

3.3.1 Current State

As of July 2021, the current state USDA IT portfolio consisted of 2,156 IT assets. Some of these IT assets were included and discussed as part of the Federal Information Technology Acquisition Reform Act (FITARA) Scorecard 8.0 hearing in June 2019. In addition, the EAD (Enterprise Architecture Division) team has collaborated with Agencies and Staff Offices to identify projected decommissioned (retired) IT assets within the portfolio. Currently, there are 297 projected decommissioned (retired) IT assets within the portfolio.

Within the Information Resource Management Center at the Department level, there are two repositories that capture IT asset data; AgMax (IT portfolio management tool) and EAVE. IT assets that are included within the repositories must proceed through an approval process; Acquisition Approval Request (AAR) and IT Asset Approval. In addition, at the Department level, the Cyber Security Assessment and Management (CSAM) system also captures IT asset data. However, the Information Security team maintains this data with processes for approval based on unique IT security parameters.

As Agencies and staff offices have provided IT asset data, a base of information is emerging. This information aids significantly in identifying areas for sharing, reuse, elimination of redundancies, and opportunities for consolidation. Continuing to capture Agencies and staff offices' IT asset data contributes to benefits for USDA. These benefits include identifying use cases and methods to enable business initiatives and greater access to information across the department.

3.3.2 Target State

Per Government Accountability Office guidance, each Department's projected or current decommissioned (retired) IT assets identified should be modernized or phased out properly. This includes required documentation of the full lifecycle effort needed to complete this task. The EAD team will continuously collaborate with Agencies and Staff Offices to ensure the required steps and processes to decommission occur seamlessly.

3.4 Mission Area Application Roadmaps and Supporting Documentation

USDA is made up of multiple agencies and offices with nearly 120,000 people who serve the American people at more than 4,500 locations across the country and abroad. Overall, there are nine Mission Areas, including Departmental Administration (DA); each play a vital role towards achieving the mission of USDA. Collectively, the mission of the Department is to provide leadership on agriculture, food, natural resources, rural

infrastructure, nutrition, and related issues through fact-based, data driven, and customer-focused decisions. Please refer to the following link for more details on each Mission Area: <https://www.usda.gov/our-agency/about-usda/mission-areas>.

Each USDA Mission Area is encouraged to develop and maintain an Application Strategy, Segment Target Architecture, and an application roadmap; which serves as a flexible planning technique to support strategic and long-range planning, by matching short-term and long-term goals with specific solutions or desired outcomes involving their application portfolios. These plans can apply to new products or processes and may include using application forecasting or scouting to identify suitable emerging technologies. Developing a roadmap or strategy assists USDA Mission Areas and Offices with three major areas:

1. Defines a set of needs and the technologies required to satisfy those needs
2. Provides a mechanism to help forecast technology developments
3. Documents a framework to help plan and coordinate technology developments

Please see Appendix C Mission Area Application Roadmaps and Supporting Documentation for collected roadmaps and supporting documentation. Please submit updated documentation to EAD for your Mission Area as available.

3.5 Innovation & Emerging Technology

USDA pursues the creation of customer value for citizens and seeks to increase the productivity of American consumers, markets, farmers, ranchers, foresters, producers, and research communities, among many others. Aligning the function of innovation to support the discovery of new and emerging information technology (IT) benefits enables an intelligent and sustainable IT modernization transition strategy, which contributes to stakeholder productivity, as well as building capacity for future change. However, understanding the relevancy of IT as a component of the public solution portfolio, as a means of accurately interpreting governance supply-demand and performance, and as an important disruption to bureaucratic institutions requires a structure and set of processes, or repeatable methods, to empower stakeholder transformation, because how we think about and define problems, conditions, and solutions determines what we value. Two communities provide focus and energy to realize these capabilities by deliberately leveraging increased collaboration and partnership.

Enterprise Information Technology Modernization (EITM) Advisory Committee

The mission of the USDA Enterprise IT Modernization (EITM) Advisory Committee (“Committee”) is to discover, promote, and make recommendations to the USDA Chief Information Officers Council (CIOC) for the adoption of new and emerging information technology (IT) solutions. Chaired by the Chief Technology Officer (CTO), members from across the mission areas, OCIO, and several outside participants, employ the resources of subject matter expertise and customer insights to identify immediate customer value creation opportunities, and furthermore, the Committee partners with USDA business and technology organizations to articulate common functional requirements, explore and leverage successful enterprise-wide capabilities, and/or rapidly locate viable IT solutions for complex uses or conditions. Committee activities are also intended complement the attraction, development, and retention of an energetic and competent business and IT workforce.

The Committee works as a complementary body to the conventional IT planning, investment, design, development, and operations functions. By emphasizing strategic implementation, as well as cost effectiveness, the Committee assumes a unique leadership advisory role locating pain points and interpreting IT modernization strategic-to-tactical alignment, where strategic principles and customer performance expectations are embedded in solutions. This intentional approach extends the value of new and emerging IT across different missions, programs, centers, and specialties. The core areas of Committee concern are essentially: 1) exploring, understanding, and communicating the new and emerging IT value proposition and solution lifecycle; 2) facilitating informed leadership decisions regarding IT alternatives and increased rates of customer adoption and enhanced experience; 3) fostering enterprise-wide and mission IT solution “speed to market;” 4) assessing the

viability of IT solution acquisition and lifecycle plans; 5) articulating sustainable business model and service levels; and 6) establishing government continuity and coordination in IT business partner relationship management.

The EITM-AC governance activities and products, such as the Enterprise IT Modernization Roadmap, offer tangible support for Target Architecture strategic direction and implementation decision-making. Workgroups are formed among experts to concentrate on specific attributes of IT solutions, which enable successful new and emerging IT integration, interoperability, transferability, modular reuse, and sustainability as core characteristics of modern business services and technology platforms.

Innovation Center

The work of human creativity and innovation involves initiating action to have something *come into being*. The Agriculture Greenhouse Innovation Lab (AGIL) is a new innovation center established as a learning “ecosystem” for cross-disciplinary and multi-agency public policy and administration IT innovation. AGIL initiatives are often tactical in nature, and support experiments and the construction of a minimal viable product (MVP) that validates and positions new and emerging IT products and services for practical deployment. Operating from within both a physical and virtual setting, AGIL participants facilitate the incubation of new ideas and lead enterprise-wide seeding and harvest of invention and fresh solutions, as well as nurture an innovation culture among USDA staff, customers, partners and other stakeholders. A key attribute of AGIL success is the ability to step outside conventional legacy frameworks and patterns of thinking to discover novel ideas and approaches for better public services.

AGIL is a service of the USDA Office of the Chief Information Officer (OCIO), led and championed by the OCIO Chief Technology Officer (CTO). The two fundamental performance outcomes of AGIL are, first, increased customer collaboration in solution design, and second, improved mission area IT alignment with the US Department of Agriculture (USDA) strategic agenda. AGIL functions as a solution accelerator for: nascent technology identification, internal and external start-ups, and public-private ventures across federal, state, local, international and tribal governments, academia, industry, non-profit, and citizen participatory governance sectors. Particular attention is focused on partnering and ideation with vendors and contractors.

The CTO provides leadership vision, strategic consulting, and facilitation to quickly identify and right-size innovation initiatives for implementation and so they might scale for multiple uses. The creation of repeatable USDA design thinking methods, and fostering organic innovation competencies, represents a tangible investment in the next generation of public servants, while exercising the advantages of human curiosity and ingenuity. Essentially, the CTO guides the AGIL portfolio as a practice-based function generating rapid discovery, transformation of sub-optimized business and technology systems, and crafting comprehensive IT solutions, which fit together naturally and require fewer resources to sustain throughout their lifecycle.

Figure 15: AGIL Value Stream Model, represents the basic path of ideation across diverse sets of requirements and solutions.

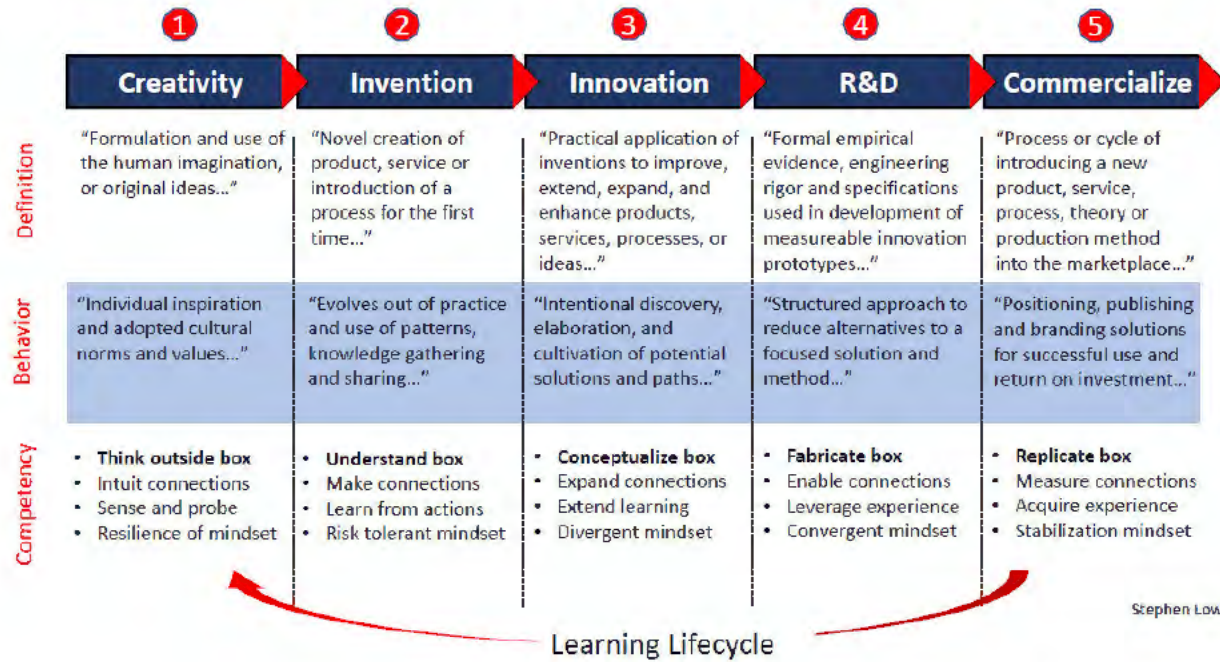


Figure 15. AGIL Value Stream Model

The value stream model represents the basic path of ideation across diverse sets of requirements and solutions, which seek to meet customer demands, as well as transform the perception of customer experience. A direct impact of the value stream is the creation of an explanation for why specific IT solutions contribute to the Target Architecture goals and objectives.

Please see the [USDA Science Council Emerging Technologies Team Charter](#) and Appendix D Innovation and Emerging Technology for further details.

INFRASTRUCTURE ARCHITECTURE DOMAIN (Section 4.0)

4.1 Overview

The Infrastructure Architecture domain is the taxonomy-based reference model that categorizes USDA's IT infrastructure and the facilities and network that hosts the IT infrastructure. The Infrastructure Architecture domain supports definition of infrastructure technology items and best practice guidance to promote positive outcomes for USDA across technology implementations.



Figure 16. The Infrastructure Architecture Layer in Relation to Enterprise Architecture

While individual Agencies may provide some infrastructure, it would be appropriate to note that OCIO provides most of the infrastructure to USDA. This is in the form of End User LANs, WANs, End User infrastructure provided by CEC, and Data Centers provided by, or acquired by DISC (cloud hosting). The Infrastructure Architecture section therefore focuses less on infrastructure than on key technologies USDA will be using.

4.2 IT Standards Profile

The IT Standards Profile collates the various systems, services, standards and rules that implement and constrain the choices that can be or were made in the design and implementation of an Architectural Description. It delineates the systems, services, standards, and rules that apply. The technical standards govern what hardware and software may be implemented and on what system. The standards that are cited may be international such as ISO standards, national standards, or organizational specific standards.

4.2.1 Current State

The associated standards with other elements of the architecture, a distinction is made between applicability and conformance. If a standard is applicable to a given architecture, that architecture need not be fully conformant with the standard. The degree of conformance to a given standard may be judged based on a risk assessment at each approval point. Note that an association between a standard and an architectural element should not be interpreted as indicating that the element is fully compliant with that standard. Further detail would be needed to confirm the level of compliance.

Standards profiles for an architecture must maintain full compatibility with the root standards they have been derived from. Although, the IT Standards Profile may state a method of implementation for a Standard, compliance with a Standard does not ensure interoperability. The standards cited are guides to the relationships amongst the systems, services, system functions, service functions, system data, service data, hardware/software items, or communication protocols.

The USDA Standards Profile and Forecast as referenced in DR 3180-001, Information Technology Standards, is updated on a yearly basis to capture emerging standards, maintain mandated standards, and retire/remove standards that have been obsoleted or removed by Standards Development Organizations (SDOs). The standards profile and forecast are following OMB Circular A119, Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities.

The emerging standards are used to align to a technology forecast. As an example, NIST has released a new standard, NIST SP 1800-4, Titled Mobile Device Security: Cloud and Hybrid Builds and published by the National Cybersecurity Center of Excellence (NCCoE) within NIST, the document offers a reference design on how to secure mobile devices within an organization, acting as a practice guide for network architects.

The Standards Forecast as with the Target Architecture is mapped out as follows: 6 months, 12 months, 18 months, 3-5 years. In the standards field, standards are considered emerging for up to and sometimes past 3 years, this is dependent on adoption by both Government and commercial entities. For the above example the NIST standard would be expected to be considered “mandated” within the next 3 years and then moved to the Standards Profile. Please see the figure below, Sample Forecast.

Keeping this in mind, when researching and adopting emerging technology, standards alignment is tantamount to ensure that the introduction of this emerging technology can be brought behind the USDA wall without detriment to security or personal information. Artificial intelligence and robotic process automation are just two examples of this type of emerging technology.

Table 3: Standards Forecast is below serves as an example only.

EXAMPLE ONLY

0 – 6 Months	6 – 12 Months	12 – 18 Months	3 -5 years
NIST SP 1800-4 Emerging	NIST SP 1800-4 Emerging	NIST SP 1800-4 Emerging	NIST SP 1800-4 Mandated

Table 3. Sample Forecast

DR 3180-001, Information Technology Standards, requires that all agencies and staff offices under the administrative oversight of the USDA OCIO adhere to the USDA Standards Profile and Forecast for systems/applications. At a minimum, the USDA Standards Profile and Forecast must be used when building out specific systems/applications profiles.

The standards in the baseline/forecast are requirements; they establish uniform criteria, methods, processes, and practices. System owners and service providers must adhere to these standards.

4.2.2 Target State

The Technical Standards Forecast defines the underlying current and expected supporting technologies, skills and service areas needed by USDA. The expected supporting technologies, skills, and service areas are those items that can be reasonably forecasted including upcoming improvements or trends. Also, the expected technologies, skills, and service areas are tied to specific time periods. These time periods will have alignment to organizational milestones and/or business strategic goals. Table 4: Application and Infrastructure Reference Model (ARM/IRM) Concept in the I-4 Technology Forecast Format (Example Only); provides a high-level example of how to show the technologies and service areas used and planned at USDA.

EXAMPLE ONLY

As-Is	Transition	Transition	To-Be
	6 – 12 Months	12 – 18 Months	3 -5 years
			Artificial Intelligence
Robotic Process Automation			
Orbus iServer (EAVE)			
Salesforce			
Service Now			
End User Consolidation			
	Datacenter Optimization		
			Network Modernization

Table 4. Application and Infrastructure Reference Model (ARM/IRM) Concept in the I-4 Technology Forecast Format [Example only]

4.3 Data Center Optimization

The Data Center Optimization Initiative (DCOI) is the method of enhancing the overall performance of USDA's data center capabilities through the implementation of various IT strategies. These strategies include but are not limited to server consolidation, server virtualization and/or service-oriented architecture (SOA) to increase processing efficiency, network availability and business scalability. Therefore, implementing a data center optimization strategy not only maximizes IT resources, but prioritizes excess expenditure costs and provides USDA the flexibility to enhance under-utilized IT functions.

4.3.1 Current State

USDA has been optimizing data center storage and strategic usage of that data going from 39 to 2 enterprise data centers, resulting in over \$61.3M cumulative savings over life of the Data Center Consolidation Initiative (DCOI) program (FY-2016 to FY-2020) and surpassing the Office of Management and Budget's (OMB) established DCOI goal for USDA by \$37.7M in cost savings. This accomplishment not only saved considerable dollars, but USDA improved its Federal Information Technology Acquisition Reform Act (FITARA) Scorecard DCOI Grade from a "D" in 2018 to an "A" in 2020.

4.3.2 Target State

For more detailed information on the USDA Data Center Optimization plan, please see the following links: [2019 DISC Annual Report](#), [DISC Intranet](#) and [USDA OCIO IT Strategic Plan](#)

4.4 Cloud Platform Services

Cloud Platform Services is a category of cloud computing services that provides software and hardware infrastructure which allows USDA to develop, run, and manage specific applications to achieve business goals outlined by Senior Leadership. This can be implemented without the complexity of building and maintaining the infrastructure typically associated with developing and launching an application hosted within an internal technology environment. These cloud computing services do not have to replace an agency or staff office's entire IT infrastructure; instead it can incorporate various underlying cloud infrastructure components. These components can include operating systems, servers, databases, middleware, networking equipment, and storage services.

4.4.1 Current State

At USDA, the Digital Infrastructure Services Center (DISC)-Data Center Hosting Services (DCHS) teams successfully achieved the FedRAMP recertification, as well as the DoD Impact Level 4 recertification. These are significant accomplishments as a Federal Cloud Service Provider. Enterprise Applications Services (EAS) launched a Department-level organization called Cloud Platform Services (CPS) that serves as a one-stop-shop for all USDA cloud services. Please note the accomplishments below:

- A. The EAS CPS Cloud Broker Office grew the Infrastructure as a Service (IaaS) Cloud financial investment from \$3.75M in FY-2018, to \$7.8M in FY-2019 and supported 13 agencies moving production workloads to commercial cloud environments;
- B. The EAS CPS Digital Services Center (DSC) manages Software as a Service (SaaS) tools and increased agreement totals from \$3.2 million in FY-2019 to \$5.7 million for FY-2020. This environment supports 44 enterprise applications, a \$47M Salesforce portfolio and over 20K users of Salesforce (SF). Department-wide negotiation of SF licensing has saved \$58M annually;
- C. The EAS CPS created a governance model and technical guidance to establish scalable and repeatable processes, accelerating cloud adoption and IT modernization goals.

Figure 17: The Agency Cloud Broker Program Participation visual below displays the agencies that participate in the USDA Cloud Program (Funding)

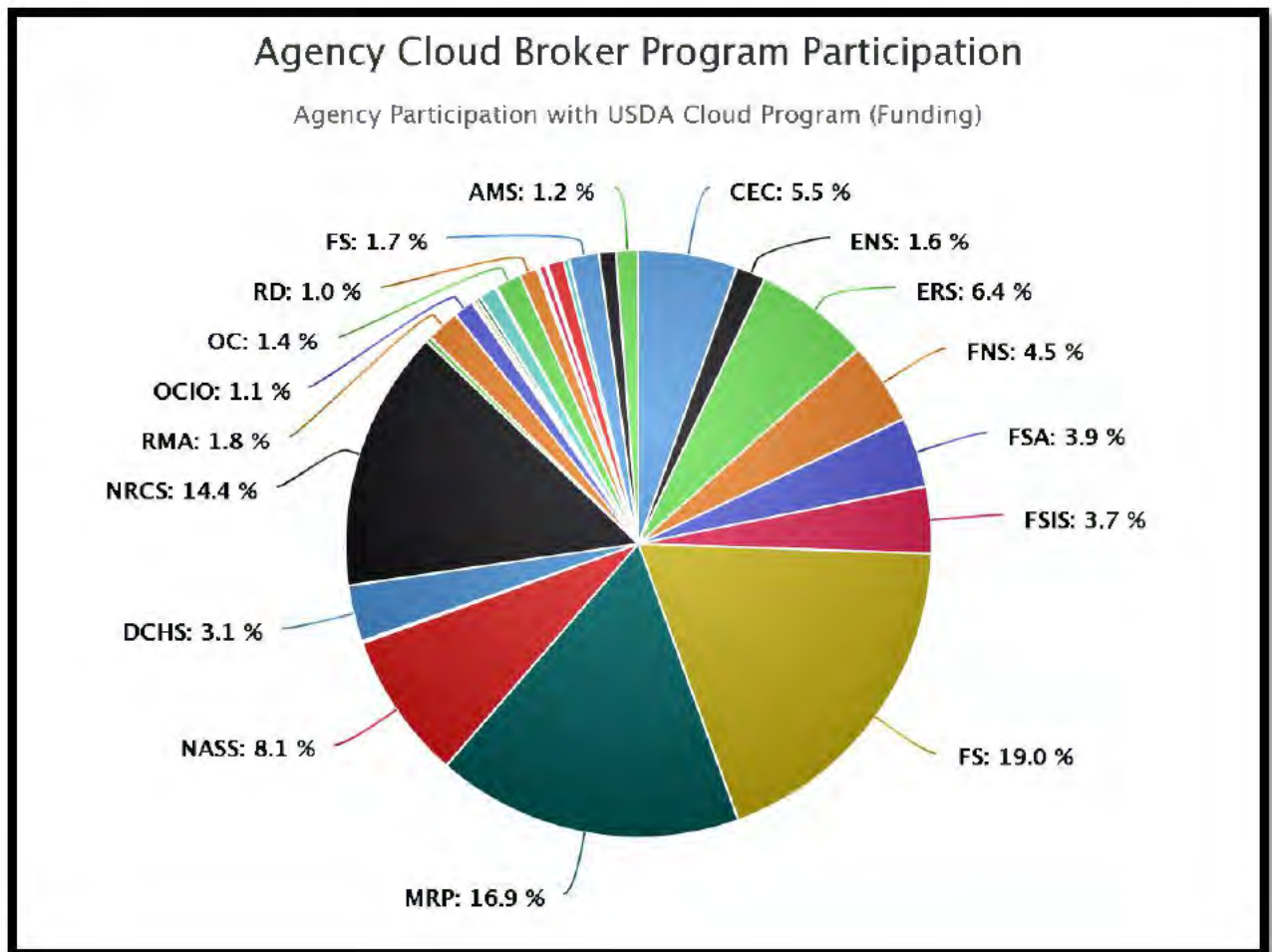


Figure 17. Agency Cloud Broker Program Participation

4.4.2 Target State

Over the next several years, the USDA CPS work-stream will provide enterprise Cloud services to Mission Areas and Agencies based on priorities and goals. Each CPS customer will have access to experts, best practices, training and events that provide a modern approach to Cloud initiatives. CPS serves as a platform agnostic organization that provides a pathway to a variety of Cloud services, including Hybrid and Private Cloud, Amazon Web Services, Microsoft Azure, Salesforce and ServiceNow to thereby promote DevSecOps practices across the enterprise.

In addition, the USDA has a strategic initiative to accelerate cloud adoption and become a Cloud Smart organization. This will enable the USDA Mission Areas and Agencies to leverage Cloud Landing Zones and Solutions. Leveraging these areas will modernize application portfolios in support of providing enhanced citizen-centric capabilities throughout rural America.

For more detailed information on USDA Cloud Platform Services, please see the following links: [2019 DISC Annual Report](#), [USDA OCIO IT Strategic Plan](#), [USDA OCIO Cloud Platform Services](#) and [USDA Cloud Program](#)

4.5 Mobile Technology Strategy

The Mobile Technology Strategy refers to the digital tools used for cellular communication and primacy of mobile networks made up of modern smartphones within a large network coverage area. This includes, but not limited to, mobile phones, Personal Digital Assistants (PDAs), global positioning system (GPS), handheld consoles, and tablets. As connected employees and customers opt for the ergonomics and convenience of the physical accommodations of non-portable devices, mobile devices and the strategy must strive to offer the same kinds of utility and sustainability.

4.5.1 Current State

The USDA Mobile Strategic Plan is established to enable the Mission Areas and Agencies to innovate, collaborate and communicate with internal and external customers using mobile devices and secure application solutions. One objective of this plan is to facilitate the development of Mission Areas and Agencies mobile security processes and procedures that align to the Departmental mobile policy suite. The implementation of the plan is imperative due to an increase in the adoption of USDA mobile technology. There has been a \$150-\$200 million-dollar investment within the mobile infrastructure space within the past 7 years. In addition, a 360 percent increase in the number of mobile devices on the network within the past 6 years.

There are several mobile initiatives identified to assist with developing the strategy and plan. (1) Enable USDA to deliver a unified mobility solution that satisfies USDA's mobility vision and use cases. (2) The establishment of USDA Mobile Community of Best Practice – Home of Mobile. (3) Development of a comprehensive suite of mobile policies and procedures for Bring Your Own Device (BYOD), device usage, mobile application procurement, development, vetting and publication. (4) Lastly, the alignment standardization of mobile application user interface and user experience design.

4.5.2 Target State

The USDA Mobile Strategic Plan and accompanying initiatives will help shape the future state of USDA mobility capabilities. Mobile endpoints and mobile application development and support are two strategies that enable the execution of the mobile initiatives. These strategies are derived from innovations originating from the field based on USDA employees' interactions with customers.

The continuous improvements in ergonomic design, computing performance, battery life and network enhancements for mobile endpoints will assist USDA in cost savings. The cost savings will be absorbed via the reduction in the number of devices need to support the mission. In addition, improvements in delivery on mission-critical services where travel and outreach are required.

The future of mobile application development and support will require strong governance processes. In addition, a community of practice to ensure improved application functionality is provided securely and efficiently. As USDA matures the mobile application development framework over the next several years, the availability of new mobile applications and the facility of existing application platforms will improve. These new applications will support the network and device improvements simultaneously, making the USDA footprint more accessible in rural areas.

For more detailed information on the USDA Mobile Technology Strategy, please see the following links: [USDA Mobile Strategic Plan](#) and [USDA OCIO IT Strategic Plan](#)

4.6 Network Modernization

Network modernization is comprised of, but not limited to, computers, devices, mobile phones, sensors, and/or other hardware which is used to connect internal and external users within USDA. To obtain and sustain the benefits of new technologies like mobility, cloud, and big data analytics, outdated IT networks should be upgraded with modern capabilities. Hence, the need for network modernization efforts. Network modernization is the process by which legacy enterprise networks that connect computers, devices, and sensors to switches, routers, and wireless access points are streamlined, updated, and/or automated. This process strives to combat

new demands, improved data orchestration, and achieve USDA's strategic business goals.

4.6.1 Current State

As part of the USDA's IT Infrastructure Optimization Initiative, the Digital Infrastructure Services Center (DISC)-Enterprise Network Services (ENS) team completed the draft Network Modernization solicitation under the GSA Enterprise Infrastructure Solutions (EIS) contract. This acquisition will provide USDANet, a next-generation capability for delivering network services across USDA in place of our existing Universal Telecommunications Network (UTN). USDANet will replace the current Wide Area Network (WAN) capability and an additional 8,000+ Service Delivery Points. Two Independent Government Cost Estimates (IGCEs) were completed, provided independent cost savings estimates of \$570M over the 10-year life cycle of the Program.

4.6.2 Target State

Over the next several years, the execution of the DISC-ENS team Network Modernization contract will enable USDA Mission Areas and Agencies to leverage Cloud Smart Landing Zones and Solutions. The Office of the Chief Information Officer (OCIO) will provide a customer centric approach to employing enterprise cloud services based on customer needs. OCIO will act as an enablement team to accelerate the adoption of cloud technologies across the USDA Mission Areas and Agencies.

In addition, USDA will modernize the network infrastructure to a single, managed, enterprise solution. This will reduce cybersecurity risks and provide a more cost-effective solution for access to shared information and bandwidth needed to improve the customer experience. Figure 18: USDANet Mission Delivery Transport graphic below is a snapshot of the different areas of USDA that will utilize USDANet and the associated benefits.



Figure 18. USDANet Mission Delivery Transport

For more detailed information on the USDA Network Modernization plan, please see the following links: [2019 DISC Annual Report](#) and [USDA OCIO IT Strategic Plan](#)

4.7 End-User Consolidation

End-user consolidation is the process by which IT infrastructure, end-user support, application development & maintenance and/or administration segments are unified to provide an increased level of service to both employees and clients. An organization can take advantage of consolidation opportunities, which can fall into specific categories. These categories include the following: better utilizing capacity, pooling IT staff, sharing best practices, consolidating procurement, and managing central governance processes.

4.7.1 Current State

The USDA is in the process of standardizing Enterprise communications and collaboration platforms. This element of the end-user consolidation initiative combines dozens of existing analog and Voice over Internet Protocol (VoIP) telephony systems into a single platform. This process saves the taxpayer in duplicative contract fees and service agreements. Similar savings and complexity reductions are on-going with consolidation and standardization of collaboration platforms providing Video Teleconference (VTC) and Instant Messaging (IM) functions. Figure 19: Benefits of End User Consolidation graphic below displays the USDA End-User Standardized Support Services

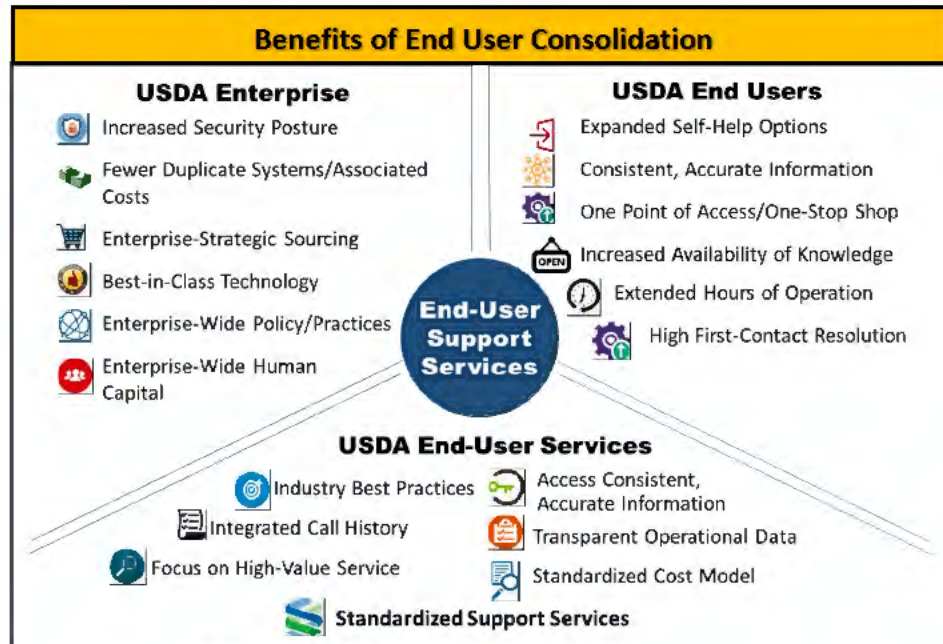


Figure 19. Benefits of End User Consolidation

4.7.2 Target State

The USDA will continue to utilize consolidation efforts to benefit employees/taxpayers and reduce environmental complexity. A near future goal is the consolidation to a single Information Technology Service Management (ITSM) platform. This effort will address Help Desk, Asset Management, and reporting functions critical to a successful End-User Support organization. A single platform reduces complexity for the end-user, streamlines the reporting of end-user support statistics, and eliminates support complexity for the staff. Lastly, migrate data to cloud-based storage solutions with integrated Records Management technology. USDA organizations are heavily dependent on legacy storage technologies that are not cost effective or sophisticated in file access and availability. A properly secured and configured implementation of a cloud-based storage platform can improve user's ability to access relevant files independent of local file servers.

For more detailed information on the USDA end-user consolidation efforts, please see the following link: [USDA OCIO IT Strategic Plan](#)

4.8 Broadband

In telecommunications, broadband is a wide bandwidth of data transmission which transports multiple signals and traffic types. The medium can be coaxial cable, optical fiber, radio, or twisted pair. In the context of internet access, broadband is used to mean any high-speed internet access that is always on and faster than dial-up access over traditional analog.

4.8.1 Current State

The USDA is continuously developing an evidence-based understanding of external customer broadband

demand, which is essential for rural connectivity improvements and access. Therefore, USDA has a priority to invest in rural telecommunications infrastructure. The current programs offer more than \$700 million per year for modern broadband e-Connectivity in rural communities. An additional \$600 million of funds will be used for expanding rural broadband infrastructure in unserved rural areas and tribal lands. The new funding option was created by the United States Congress in the Consolidated Appropriations Act of 2018, as an initiative to rebuild America's infrastructure.

Reliable and affordable high-speed internet e-Connectivity, or electronic connectivity, is fundamental for economic activity throughout the US. Access to high-speed internet is vital for a diverse set of industries, including agricultural production, manufacturing, mining and forestry. Also, this access acts as a catalyst for rural prosperity by enabling efficient, modern communications between rural American households, schools, global markets/customers and healthcare centers. The Agriculture and Rural Prosperity Task Force recommended e-Connectivity, as a pilot program, for all rural Americans because it is a modern-day necessity, not simply an amenity, in today's information-driven global economy.

The framework outlined by Congress in this new pilot program is different than other USDA Broadband programs. USDA is currently reviewing all legal aspects and setting up administrative operations for carrying out this new pilot program. America's economic prosperity is dependent on rural America's ability to compete in the new global economy and rural broadband e-Connectivity is fundamental to achieving America's potential in the 21st Century.

4.8.2 Target State

As part of the future state strategy identified for Broadband, improving bandwidth availability throughout USDA field offices is a priority. OCIO will continue to improve bandwidth availability to local area networks in state and local offices. As service availability improves via vendor expansion, OCIO will continue to offer additional improvements and introduce higher-capacity circuits to new offices. Providing this network improvement is critical for rural offices to take advantage of new technologies and improve administrative and customer service performance.

In addition, OCIO will discover alternative bandwidth solutions for offices that are currently unable to take advantage of broadband network services. This is to ensure connectivity without the dependence of office circuits. Having the ability to access alternative bandwidth solutions for access to USDA services in remote locations is beneficial to core customers-the American farmer, rancher and producer. Improvements in wireless technology that are planned, will enable and expand this ability for USDA employees and customers.

For more detailed information on USDA Broadband efforts, please see the following links: [USDA Broadband](#) and [USDA OCIO IT Strategic Plan](#)

SECURITY ARCHITECTURE DOMAIN (Section 5.0)

5.1 Overview

The Security Architecture domain uses a framework for developing a security architecture based on information security and privacy standards. A uniform security architecture is created through three areas: Purpose, Risk and Controls. The Security Model is pervasive, weaving itself into all of the sub-architectures of the overarching EA across all the other domain reference models (Performance, Business, Data, Application and Infrastructure). As a model, it provides a mechanism for communicating what the actual world looks like in terms of its framework. The model permits us to communicate between Enterprises, between other models and up and down the different levels of the Enterprise those pieces of information that are relevant to making decisions affecting its

domain.

Cybersecurity protects the USDA mission by ensuring the integrity, availability and confidentiality of IT systems/applications. Cyber threats are ongoing and quickly evolving. The Federal Government's cybersecurity posture, policies and requirements are updated continuously to address adversarial tactics. Many required statutes and polices ensure Federal cybersecurity, including the *Federal Information Security Madernization Act (FISMA) of 2014*; the *Privacy Act of 1974*; the *E-Government Act of 2002*; and numerous Office of Management and Budget (OMB) memoranda.

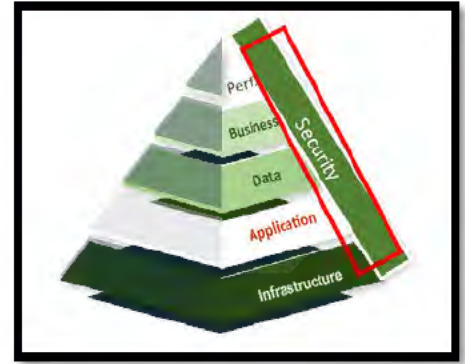


Figure 20. Security Architecture Layer in Relation to Enterprise Architecture.

USDA will standardize and consolidate the operational functions of cybersecurity and transform them into a shared service. A department-wide shared service security operations center will reduce security risks and vulnerabilities through synchronization, integration and centralization of IT security capabilities. Other benefits of this consolidation include reducing cost, eliminating redundancies and enhancing the customer experience.

Given the complexity and importance of cybersecurity, cybersecurity professionals, with knowledge of Federal and USDA requirements, are included as an integral stakeholder to provide input and guidance throughout the entire lifecycle of the service, application or system.

Cybersecurity is not an “add-on”; it safeguards the availability, integrity and confidentiality of the Department’s information, technology and stakeholders. Cybersecurity professionals must be highly involved during every lifecycle phase and incorporate real-time, enterprise monitoring through the Department’s Information Security Center (ISC).

ISC is targeting to centralize cybersecurity functions and capabilities to eliminate duplicity, fragmentation and to capitalize on the economies of scale. Those functions and capabilities include the following:

- Centralizing OCIO security operations to align with National Institute of Standards and Technology Cybersecurity Framework
- Cultivating a high performing cyber workforce
- Shifting the paradigm to business driven and customer-centric service delivery
- Striking a balance between cybersecurity risks and business requirements
- Identification, protection and recovery of functions so Mission Areas can focus on mission objectives and secure technology delivery
- Operationalizing scorecards and metrics

5.1.1 Current State

The current state of cybersecurity within the USDA is shifting to a centralized structure. The Cybersecurity Architecture Branch (CSAB) has recently conducted a preliminary survey and found 50 security tools currently in use within the USDA. CSAB is currently reaching out across the USDA to document additional security tools that may be operating within any agency siloed environments.

The USDA is working with the Department of Homeland Security (DHS) to implement the tools and capabilities identified to implement the Continuous Diagnostics and Mitigation (CDM) program. The CDM Program enhances USDA enterprise security through automated control testing and progress tracking. This approach, provides services to implement sensors and dashboards, delivers near-real time results, prioritizes the worst problems within minutes versus quarterly or annually, enables defenders to identify and mitigate flaws at network speed, and lowers operational risk and exploitation of government IT systems and data. Additionally, for federal cyber investments, the program fulfills Federal Information Security Management Act (FISMA) mandates. The program is designed to rigorously ensure personal privacy. Data sent from CDM participant networks to DHS does not include any Personally Identifying Information (PII) or information about specific

department, agency computers, applications, or user accounts. Figure 21: CDM Program Focus Areas graphic below displays the phases and related data elements for CDM implementation.

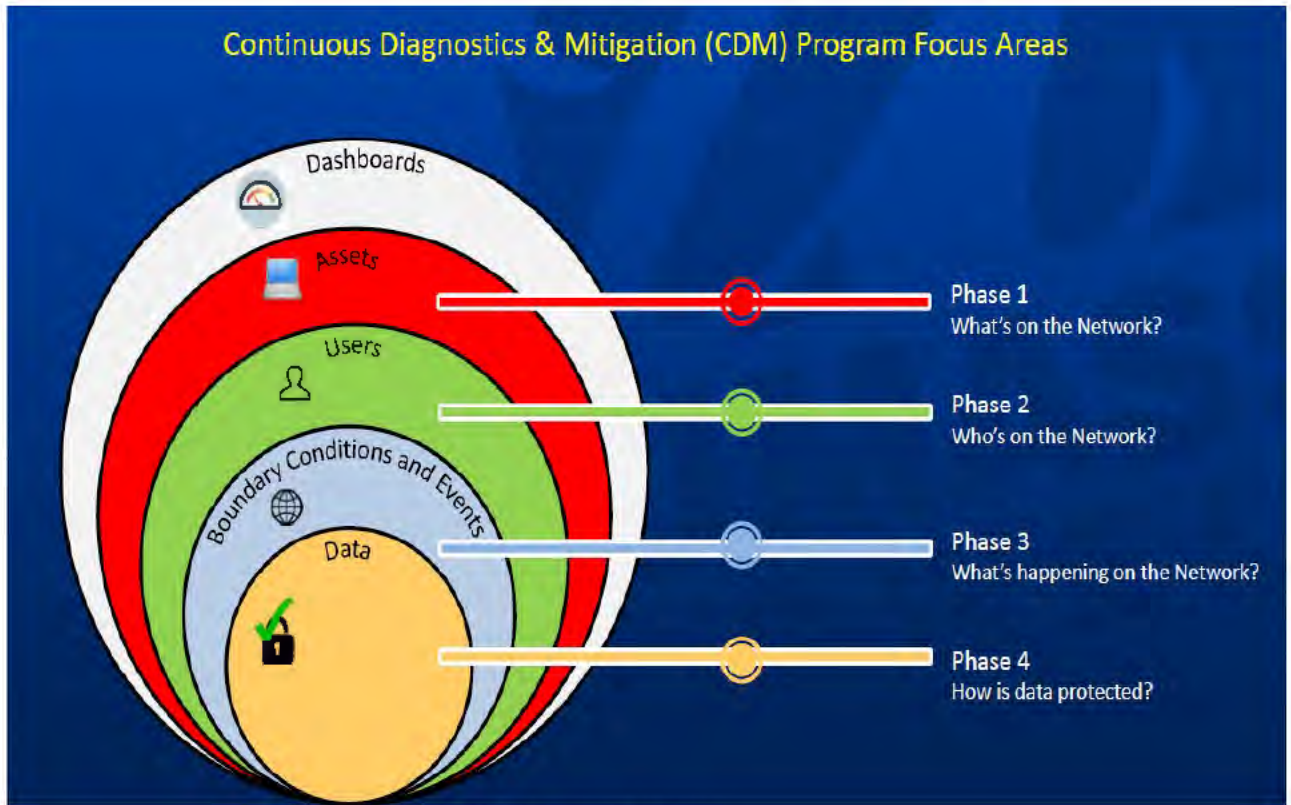


Figure 21. CDM Program Focus Areas

Utilizing a gap analysis, the ISC has mapped known security tools and capabilities within OCIO, to NIST's Cybersecurity Framework (CSF), with each tool having a primary and secondary CSF function. Additionally, those tools and capabilities map directly back to a service ISC provides. ISC Services contain ISC Program Areas which contain security capabilities that align with CSF directly. ISC is committed to be a service driven organization, and that is reflected in its organizational structure and service delivery lines. This gap analysis will provide a roadmap to eliminate security redundancies and identify missing critical capabilities. Figure 23: NIST Categories graphic below displays the related segments of the CSF.

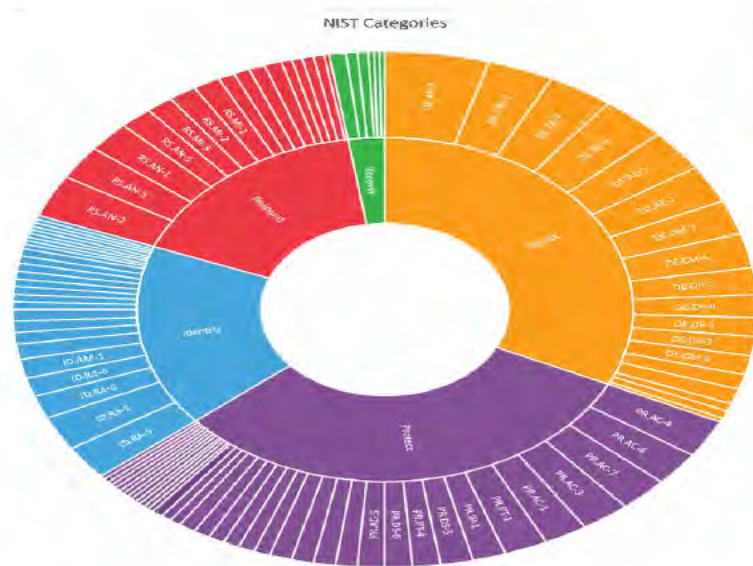


Figure 22. NIST Categories

The CSAB is also in the process of fully integrating security with Enterprise Architecture (EA) model to share a common vision on the USDA's security posture. The ISC Cyber Security Architecture team has access to the new EA tool, Enterprise Architecture Vision Environment (EAVE). ISC is working to populate this capability with the above-mentioned security tools. This will serve as the most up to date repository for IT assets, their service lifecycles, and other useful information for the department. Mission Area IT asset details will be incorporated within the tool in phases, based on priority from Senior Leadership.

CSAB is also leading the consolidation effort of all Digital Infrastructure Services Center (DISC) and Client Experience Center (CEC) security tools into the ISC environment. Significant progress in this area should come to fruition within FY2021.

5.1.2 Target State

The envisioned target state by cybersecurity is to align all security functions directly to the National Institute of Standards & Technology Special Publications (NISTSP), NIST Cybersecurity Framework (CSF), Federal Enterprise Architecture Framework (FEAF), Federal Information Processing Standards (FIPS), and enforcement of USDA Departmental policy. The current policies and architecture will also be transformed using the pillars contained within the NIST SP Zero Trust Architecture 800-207. Figure 23: USDA Zero-Trust Vision graphic below displays the target state architecture for ISC with alignment to NISTSP.

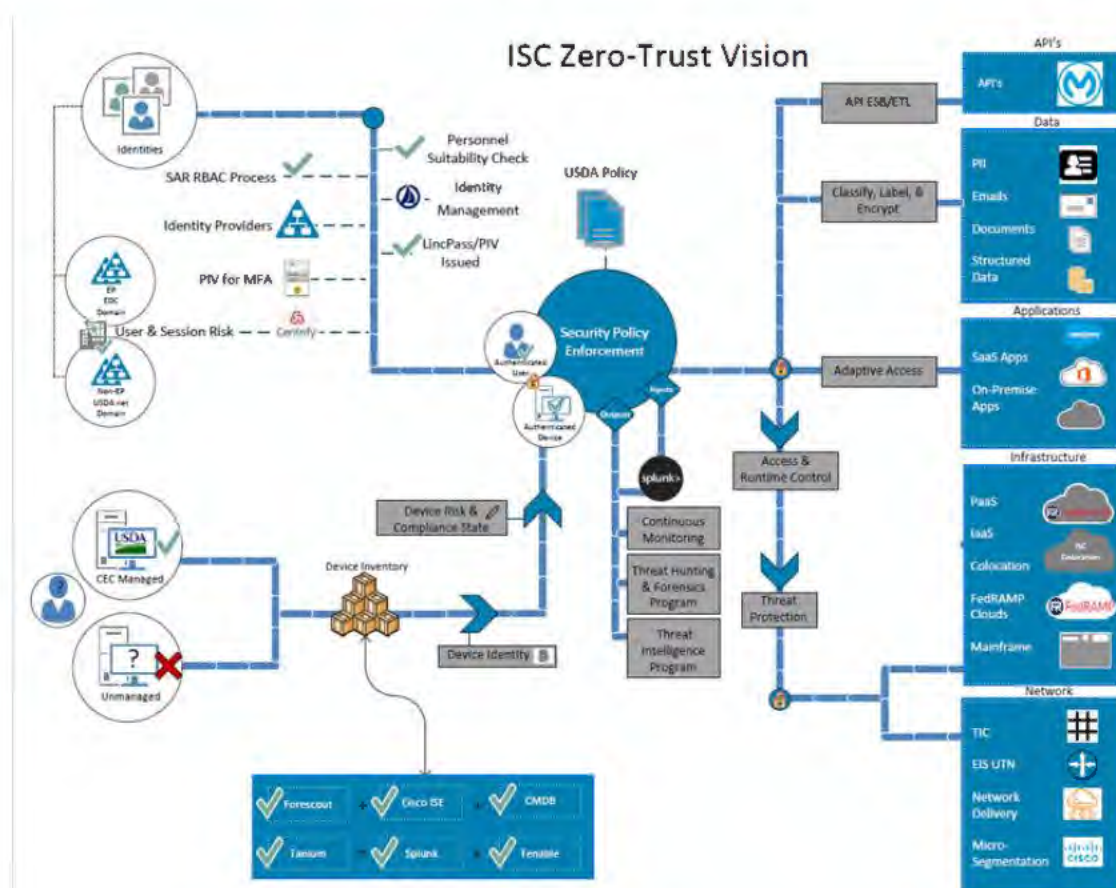


Figure 23. USDA Zero-Trust Vision

The primary areas of these efforts will be focused and targeted in these following areas.

- Define and Implement the Zero Trust Architecture (ZTA) across the USDA
- Complete Security Tool and Personnel Consolidation
- Offer Security Operations Center as a Service (SOCaaS) to the agencies
 - Provides inheritable controls for use in ATOs

- Cost savings through repeatable processes
- Reduce complexity and overhead to meet audit controls
- Security Information & Event Management (SIEM) Consolidation
- Improvement of USDA Federal Information Security Management Act (FISMA) score
- Finalize Data Center Security Consolidation (DCSC)
- Design security architecture for the new Saint Louis Data Center
- Continue implementing CDM phases
- Implement a Comprehensive Data Loss Prevention (DLP) program
- Trusted Internet Connection (TIC) 3.0
- Implement USDA rollout of Network Access Control (NAC) tool
- Ensure Critical vulnerabilities are remediated
- Integrate Security Service delivery with USDA's EIS project
- Evolve security domain governance

When the target state is achieved the USDA will benefit from the implemented proactive security posture, cost savings, efficiencies in program and service delivery, and reduction of duplicated tools. The implementation of CDM, ZeroTrust, and SOCaaS will standardize security for USDA.

For more detailed information on USDA cybersecurity efforts, please view the following links:

<https://www.nist.gov/>

<https://www.nist.gov/cyberframework>

<https://www.cisa.gov/cdm>

<https://www.cisa.gov/federal-information-security-modernization-act>

<https://www.cms.gov/Research-Statistics-Data-and-Systems/CMS-Information-Technology/EnterpriseArchitecture/FEAF>

<https://www.ocio.usda.gov/about-ocio/information-security-center-isc>

ENTERPRISE ARCHITECTURE VISION ENVIRONMENT

(EAVE) (Section 6.0)

6.1 Overview

An Enterprise Architecture Committee (EAC) Department-wide working-group selected Orbus iServer in September 2019 as the new Enterprise Architecture (EA) tool for the Department. This tool will serve as the most up-to-date repository for IT assets, associated service lifecycles, critical attributes, and other useful information for the department. The new EA tool (EAVE) [Orbus iServer Business and IT Transformation Suite] is a software platform that organizations use to manage, govern, and visualize business and IT transformation details. Also, this software allows organizations to leverage existing Microsoft applications and technologies, including Visio, Word, Excel, and PowerPoint. In addition, Orbus iServer includes capabilities for importing data directly into the iServer repository from those Microsoft applications.

6.1.1 Current State

The Orbus iServer tool (EAVE) has been used to support application rationalization processes and procedures at USDA. The Enterprise Architecture Division (EAD) team led the development, implementation, and deployment of iServer (EAVE). In addition, the EAD team adopted Agile Scrum, supported by Microsoft Teams, as a framework to migrate and update Mission Area and Agency IT asset data in EAVE.

Utilizing Agile Scrum, the EAD team developed Sprint goals with accompanying user stories in Microsoft Teams. The Sprint Goals entailed retrieving an accurate list of applications and numerous critical attributes (e.g., acronym, aliases, contract id, lifecycle status, etc.). In addition, the objective was to assist Mission Areas and Agencies to become self-sufficient navigating the tool and to achieve a near-term 70% completion ratio for IT asset data.

The EAD team developed a set of strategies to streamline the Mission Area and Agencies' collaboration methods and to accomplish the Sprint goals:

- Identify Agency IT asset repository source;
- Reconcile AgMax IT assets vs external sources (CSAM, CloudBroker, and EAuthentication application lists) to identify relevant deltas;
- Identify and/or develop critical attributes;
- Import relevant IT asset details and critical attributes into iServer (EAVE);
- Facilitate working sessions with Agency POC's to discuss the import process and missing data elements;
- Facilitate follow-up working sessions with Agency POC's regarding import questions;
- Facilitate follow-up working sessions with Agency POC's to discuss and review the EAVE dashboard scorecard.

In addition to the initial EAVE implementation, the EAVE Meta-Model Working Group was also formed. The EAVE Meta-model working group provides governance and guidance for Mission Area and Agency stakeholders. The governance and guidance artifacts developed by this group produced a framework for best practices and controls regarding the use of EAVE. Some specific areas of focus have been the Mission Area and Agency folder structure, critical attributes, meta-model updates, and repository enhancements.

Figure 24: EAVE Conceptual Meta-model Example, represents a high-level conceptual meta-model example of the USDA Orbus iServer IT assets and related critical attribute data elements and information flow. For more detailed information on the USDA Orbus iServer Meta-model, please see the embedded file below Figure 25.

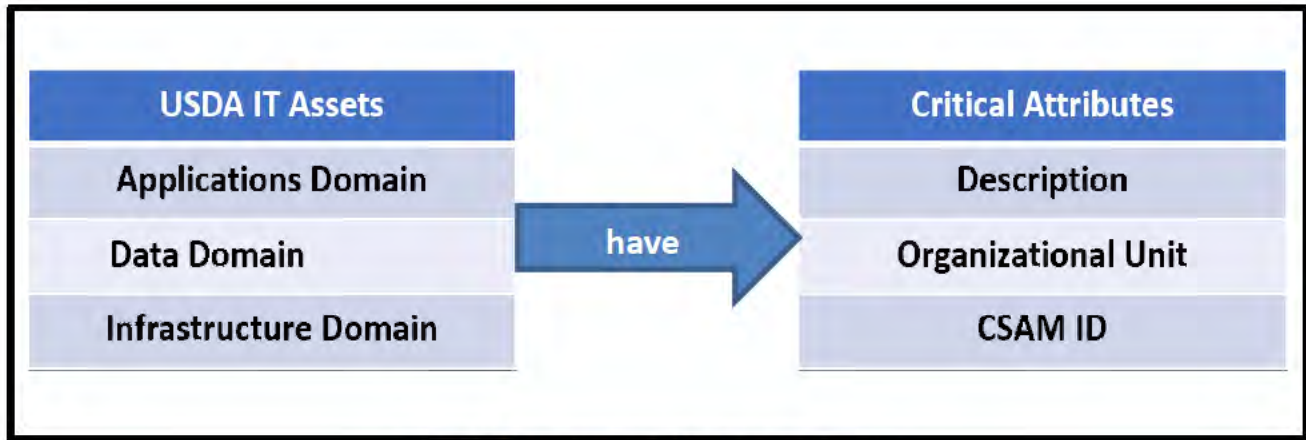


Figure 24. EAVE Conceptual Meta-model Example

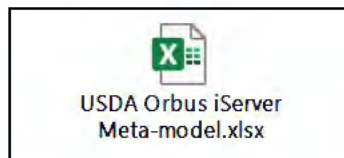


Figure 25: EAVE Snapshot, represents a snapshot of the EAD Enterprise Architecture repository portal home page screen.



Figure 25. EAVE Snapshot

The Orbus iServer tool (EAVE) has been used to support application rationalization processes and procedures at USDA, specifically the Applications domain. In addition, this tool will be used to strategize and implement the infrastructure architecture scope. The infrastructure architecture scope will encompass platform services, application services, system services, end user services (mostly devices), network services, and security services.

The EAVE Infrastructure Reference Modeling Group is currently collaborating with Mission Area and Agency stakeholders to determine specific EA frameworks, attributes, appropriate artifacts, etc. based on the initial scope. During the collaboration period between the group and stakeholders, input and concepts will be adjudicated prior to the meta-model configuration in the EAVE development environment. The EAVE

development environment is a workspace for the group and stakeholders to perform updates and modifications to the frameworks, attributes, appropriate artifacts, etc. utilizing the tool capabilities without making alterations to the live environment data.

6.2.2 Target State

Geospatial assets and the accompanying data have been identified by the application rationalization team as a first priority, and EAVE is being used to pilot AppRat for Geospatial assets. The goal of this pilot is to identify duplicative assets and the cost savings that can be achieved by analyzing departmental data populated in this tool by Mission Area and Agency stakeholders. Geospatial information is critical to USDA because the mission of the Department is directly tied to the land, and the information collected, analyzed, and used to make informed business decisions for the American people.

Geospatial data at USDA is described as features or phenomena that can be referenced to specific locations relative to the earth's surface. For example, features such as buildings, rivers, road intersections, power plants, and national parks can all be identified by their locations. In addition, phenomena such as wildfires, the spread of an enterovirus, and the thinning of trees due to acid rain can also be tracked by their geographic locations.

In October 2018, Congress passed the Geospatial Data Act of 2018 (GDA). The GDA codifies the committees, processes, and tools used to develop, drive, and manage the National Spatial Data Infrastructure (NSDI) and recognizes responsibilities beyond the Federal government for its development. Therefore, in addition to the EAVE Geospatial pilot, USDA will develop and publish the Enterprise Geospatial Strategic Plan. This plan will outline current geographic information and related geospatial activities in support of the NSDI. Also, USDA will report on achievements and progress for complying with requirements of the GDA.

Once the updates and modifications within the EAVE development environment are steady state, the group will socialize and provide a mock-model to the department. If there are no further comments and suggestions from department leadership, the group will move forward with deploying the development environment's meta-model configuration to the production environment. At this time, the configured frameworks, attributes, appropriate artifacts, etc. will be available for use by Mission Areas and Agencies in EAVE. Once the agreed upon configurations are deployed in the EAVE production environment, any suggested modifications to the meta-model will have to proceed through the EAVE Meta-model Working Group. Please see Section 3.4.1 Enterprise Architecture Vision Environment – Current State for further details on the EAVE Meta-model Working Group.

With the implementation of EAVE, necessary steps are taking place to ensure proper creation and maintenance of the five architectural domains. Following the completion of the Infrastructure and Application Architecture domains, USDA will begin working on the Data Domain within EAVE, aiming for beginning this in Fiscal Year 2021. This will consist of combing through Mission Area inventories and determining what components are deemed databases and belonging in the data domain. This will correlate with the Application Inventory and Critical Attributes reconciliation that EAD is performing and will be accelerated to the forefront once the Application and Infrastructure Domains are completed.

Beginning with determining who key data stakeholders are in USDA, the goal is to understand their needs completely and consistently in order to create a data domain that is prioritizing stability over design. We will be focused on defining the business data and their interrelationships. Following the creation and continued maintenance of the data domain within EAVE, there will be a push to maintain linkages to existing files as well as create new connections between EAVE and the Data Lake, highlighting future areas for improvement.

GOVERNANCE FOR EA ARCHITECTURES (Section 7.0)

7.1 Overview

Governance bodies are a collective unit that develops and implements decisions that form policy, plan strategic direction, and establishes organizational goals. In addition, governance bodies lead decision-making processes, oversee financial direction, and provide accountability for the organization. Therefore, these strategic plans and accountability measures that are developed ensure the organizational investments generate business value and mitigates risks.

Overseeing all USDA architectures is the Enterprise Architecture Committee (EAC), which is a component of the Department's Integrated Advisory Board (IAB), along with 3 similar groups (portfolio management, security, and critical partners). The IAB advises/recommends to the Executive IT Investment Review Board (E-Board). For more information on the IAB governance structure, please see the Integrated IT Governance Framework (v 3.3).

The EAC is actively meeting monthly with representatives from around the Department participating on a regular basis. The EAC establishes IPTs as needed, to dive deeper into issues and tasks, and votes on items put forth by those IPTs such as architecture design decisions (e.g. recent establishment of the USDA standard (Level 1 and 2) Business Capabilities Model).

As discussed in 3.5 Innovation & Emerging Technology, the CTO chairs a relatively new committee of CTOs around the department – the USDA Enterprise IT Modernization (EITM) Advisory Committee to discover, promote, and make recommendations to the USDA Chief Information Officers Council (CIOC) for the adoption of new and emerging IT solutions. The Committee works as a complementary body to the conventional IT planning, investment, design, development, and operations functions.

7.2 Business Architecture Governance

The governance bodies that facilitate management of the Business Architecture for the Department are described below.

7.2.1 Current State

EAD has been leveraging the monthly Enterprise Architecture Committee (EAC) meeting to facilitate decision-making and approvals associated with the work of the Business Architecture Community of Practice (BA CoP), a sub-committee of the EAC. The BA CoP is used to validate, update, or redefine existing USDA Business Capabilities and adopt any Industry Reference Model capabilities, where applicable. Also, BA CoP members are decomposing business capabilities to Level 3 (Level 4 in some cases) to continue to establish a standard USDA Business Capabilities baseline.

7.2.2 Target State

The EAD team will leverage the BA CoP to establish a governance plan for implementing/ adding new Enterprise and Mission Area/Agency specific business capabilities, including the frequency in which the current baseline is reviewed. Also, the BA CoP will continue to work with the Metamodel Working Group to implement any BA domain attributes changes within EAVE.

7.3 Data Architecture Governance

The governance bodies that facilitate management of the Data Architecture for the Department are described below.

7.3.1 Current State

The Chief Data Officer (CDO) has established an Enterprise Data Governance Structure to manage USDA's data as strategic asset Figure 26: The Data Governance Board Hierarchy. The Data Governance Board comprises of a

Steering Committee of Chief Operating Officers, headed by the Chief Data Officer and an Advisory Board, headed by the Deputy Chief Data Officer. Existing working groups are being integrated into this governance structure and new working groups can be stood up as needed.

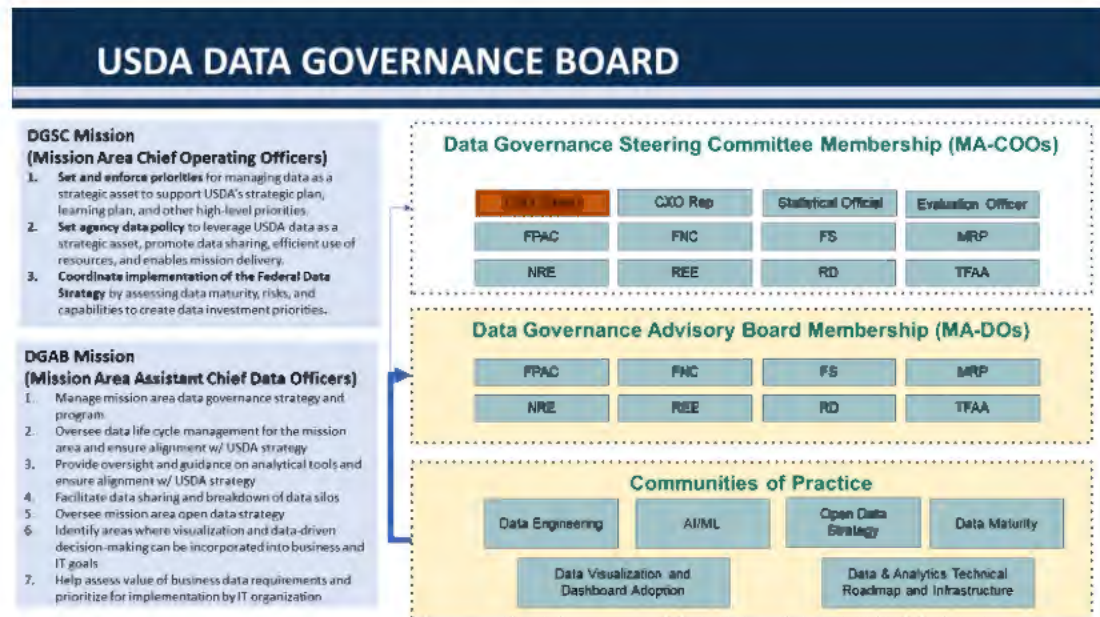


Figure 26. The Data Governance Board Hierarchy

The main benefit of this initiative is that Mission Areas, Agencies, Staff Offices, Chief Executive Officers, and leadership will be able to make data-driven, fact-based decisions.

7.3.2 Target State

TBD

7.4 Application Architecture Governance

The governance bodies that facilitate management of the Application Architecture for the Department are described below.

7.4.1 Current State

Department management of the Application Architecture takes place at varying levels. Mission Areas and Agencies manage their individual mission-specific portfolios of applications through collaboration of those MA/Agency enterprise architects and portfolio managers. In doing so, they follow the Department's Integrated IT Governance Framework (IITGF), or MA/Agency equivalent, involving stage gate reviews and decision-making.

At the Department level, enterprise application portfolios are managed by assigned MAs/Agencies, similar to above. The Department also leverages EAVE to standardize the collection, analysis, and reporting of all applications for the Department and their associated architectural relationships.

Application Rationalization efforts have been ongoing at the Department level and at various MAs/Agencies. A Department-wide Application Rationalization IPT has been ongoing since 2020 to refresh, standardize, and share best practices for a new USDA AppRat Operational Framework. The Pilot involving all GeoSpatial applications is expected to complete in September 2021.

7.4.2 Target State

For the Target State, IRMC will continue to facilitate improvements to the completeness and quality of data in EAVE for all of the Department's applications. IRMC will also continue to facilitate improvements to the

processes, procedures, and analytics for the IT governance framework, its stage gate reviews, and application rationalization efforts, in order to support better decision-making via an informed enterprise perspective.

7.5 Infrastructure Architecture Governance

The governance bodies that facilitate management of the Infrastructure Architecture for the Department are described below.

7.5.1 Current State

A Standards Profile IPT meets monthly. Voting on changes to the Standards Profile is performed twice per year via the EAC.

As described in Section 4.0 (Infrastructure Architecture), OCIO provides most of the infrastructure for USDA via Datacenter Optimization, Cloud Platform Services, Mobile Technology Strategy, Network Modernization, End User / Help Desk Consolidation, and Telecommunications Broadband. Each of these Department-wide initiatives are led by associated Department groups to modernize, consolidate, and govern these infrastructures centrally. The Integrated Advisory Board (IAB) and Executive Investment Review Board (E-Board) are kept advised and used for decision-making support.

7.5.2 Target State

No specific changes from above.

7.6 Security Architecture Governance

The governance bodies that facilitate management of the Security Architecture for the Department are described below.

7.6.1 Current State

Security governance is centralized via the Department's Information Security Center (ISC), supported by regular monthly meetings of the ISC Committee, and supplemented by IITGF stage gate reviews.

7.6.2 Target State

Evolve security domain governance for the implementation of the Zero Trust Architecture discussed in section 5.0.

7.7 Enterprise Architecture Governance Maturity

USDA's ITMMM (IT Management Maturity Model) for Governance addresses FITARA requirements for Enterprise Architecture. Most relevant is the ITMMM Governance Model Attribute of 'Right Information':

- Does each level of governance (and associated governance bodies) have the means to obtain the right information to be able to make properly informed decisions?
- Does Enterprise Architecture inform the integrated IT governance process?
- Is there evidence-based decision making? Is there transparency and information accountability?
- Are metrics actively used to measure effectiveness of governance? (metrics on governance process – meeting regularly, outputs)

Below are two critical ITMMM Governance Model Traits to verify and validate across the Department the evidence of proper EA governance within USDA at the CXO and Mission Area levels.

- Enterprise governance is supplied with objective information and analysis to support strategic decision making.
 - Level 1: Some objective analysis but much information tends to be anecdotal.

- **Level 2:** Analysis and information is generally provided to support strategic decision making; improvements can be made in obtaining information, particularly from the portfolios and external entities
 - **Level 3:** Information is supplied from both internal (portfolios) and external entities regarding expectations of performance for the agency, perceived or real shortfalls, political imperatives, etc. that fully supports decision making on strategic direction and objectives.
- EA model enables portfolio-level governance to assess the state of the portfolio, assisting with decisions that are in alignment with mission or business outcomes.
 - **Level 1:** EA exists, but does not fully represent current state of the portfolio; there is uneven analysis of the 'to-be' state to support improved mission or business outcomes.
 - **Level 2:** EA is incomplete in at least one dimension; the current portfolio is mostly understood but has gaps in the 'to-be' state to support improved mission or business outcomes.
 - **Level 3:** Mature EA enables full transparency of the current state of the portfolio, and enabling complete analysis of the 'to-be' state to support improved mission or business outcomes.

GLOSSARY

Acronyms

AI	Artificial Intelligence
App	Application
ATO	Authority to Operate
BMO	Business Modernization Office
BPA	Blanket Purchase Agreement
BYOD	Bring Your Own Device
CDO	Chief Data Officer
COE	Centers of Excellence
CRM	Customer Relationship Management
EAMO	Enterprise Architecture Management Office
ENS	Enterprise Network Services
FISMA	Federal Information Security Modernization Act
GFE	Government Furnished Equipment
GSA	General Services Agency
ISC	Information Security Center
IPT	Integrated Project Team
IT	Information Technology
NASS	National Agricultural Statistics Service
NIST	National Institute of Standards and Technology
OAI	Office of American Innovation
OCIO	Office of the Chief Information Officer
OMB	Office of Management and Budget
PaaS	Platform as a Service
PMO	Program Management Office
RPA	Robotic Process Automation
UAS	Unmanned Aerial System
UASAG	Unmanned Aircraft Systems Advisory Group
UAV	Unmanned Aerial Vehicle
USDA	United States Department of Agriculture

Definitions

Broadband - Digital communication technology in which (in contrast to baseband) the bandwidth (data carrying capacity) of a single medium such as a wire, cable, or channel is divided into several independent pathways. Using techniques such as frequency division multiplexing, broadband enables fast (45 Megabits per second or more) and simultaneous transmission of different signals (data, audio, video), and interconnection of different devices on a network. (<http://www.businessdictionary.com/definition/broadband.html>)

Customer Relationship Management (CRM) - is the ability to strategically manage an organization's interaction with current and potential stakeholders.

Geospatial Data - Geospatial data describes features or phenomena that can be referenced to specific locations relative to the earth's surface. For example, features such as buildings, rivers, road intersections, power plants, and national parks can all be identified by their locations. In addition, phenomena such as wildfires, the spread of an enterovirus, and the thinning of trees due to acid rain can also be tracked by

their geographic locations. GIS data or geodata has explicit geographic positioning information included within it or contains coordinate geometry. More information can be found in the Geospatial Data Act ([43-usc-ch-46-geospatial-data-geospatial-data-act.pdf \(fgdc.gov\)](#)):

“(5) the term "geospatial data"—

(A) means information that is tied to a location on the Earth, including by identifying the geographic location and characteristics of natural or constructed features and boundaries on the Earth, and that is generally represented in vector datasets by points, lines, polygons, or other complex geographic features or phenomena;

(B) may be derived from, among other things, remote sensing, mapping, and surveying technologies;

(C) includes images and raster datasets, aerial photographs, and other forms of geospatial data or datasets in digitized or non-digitized form; and

(D) does not include— (i) geospatial data and activities of an Indian tribe not carried out, in whole or in part, using Federal funds, as determined by the tribal government; (ii) classified national security-related geospatial data and activities of the Department of Defense, unless declassified; 9/25/2020 2/13 (iii) classified national security-related geospatial data and activities of the Department of Energy, unless declassified; (iv) geospatial data and activities under chapter 22 of title 10 or section 3045 of title 50; (v) intelligence geospatial data and activities, as determined by the Director of National Intelligence; or (vi) certain declassified national security-related geospatial data and activities of the intelligence community, as determined by the Secretary of Defense, the Secretary of Energy, or the Director of National Intelligence;”

APPENDIX A: REFERENCES

[E-Government Act of 2002](#), 44 U.S.C. §3501

[EGMO Operations Proposal](#), May 2017

[Federal Information Security Modernization Act of 2014 \(FISMA 2014\)](#), (P.L.) 113-283

[FedTech Magazine - OMB to Release Government Strategy on Automation Technology](#)

[Geospatial Strategic Plan](#), 2019-2021 [*New version requested*]

[Geospatial Data Act of 2017](#)

[USDA is Investing in Rural Broadband](#)

[USDA Strategic Plan 2018-2022](#)

APPENDIX B: ARTIFACTS

[AgCloud Managed Services CASP](#)

[Agency Feedback Cloud Eligible Apps, September 28,2018](#)

[APHIS IT Roadmap 2018](#)

[Artificial Intelligence - NIFA](#)

[Artificial Intelligence with Strawberries May Improve Food Quality and Safety While Minimizing Field Labor, September 27,2018](#)

[CDSI Legacy System Decommissioning Plan, June 14, 2016](#)

[End User Consolidation, March 6, 2019](#)

[FNCS Data Center and Cloud Migration Roadmap](#)

[FNS National Office Decommissioning Plan, September 28,2018](#)

[FSA Planned Decommission](#)

[FSIS IT Quarterly Review, October 2018](#)

[Infrastructure Optimization, October 24, 2018](#)

[IT Modernization Centers of Excellence Status Update, March 6, 2018](#)

[IT Modernization Centers of Excellence Cloud/Infrastructure Update, March 7, 2018](#)

[Mobile Strategic Plan, October 2018](#)

[MRP Cloud Migration and Data Center Optimization Plan](#)

[MRP IT System Decommissioning WBS](#)

[NRE Strategic Vision 2.6 – 2019-2024](#)

[OCIO CEC Org Chart, 2018](#)

[Overarching FAS IT Systems Roadmap, September 28, 2018](#)

[RMA Decommission Plan September 28, 2018](#)

[Standards Profile/Forecast FY21](#)

[USDA GovCloud Solutions](#)

[USDA IT Strategic Plan FY19-22](#)

[USDA Strategic Plan 2018-2022](#)

APPENDIX C: MISSION AREA APPLICATION ROADMAPS AND SUPPORTING DOCUMENTATION

Mission Areas

{For each MA, please forward your MA's 2021 Roadmap or Strategy for insertion by EAD below}

Farm Production and Conservation (FPAC)

Farm Production and Conservation (FPAC) is the Department's focal point for the nation's farmers, ranchers, other stewards of private agricultural lands and non-industrial private forest lands. FPAC agencies implement programs designed to mitigate the significant risks of farming through crop insurance services, conservation programs and technical assistance, commodity, lending, and disaster programs.

Application Roadmap or Strategy:

Supporting Documentation – Executive Information Technology Investment Review Board – August 2020:



Update_
OSEC_USDA IT Briefi

Food, Nutrition and Consumer Services (FNCS)

Food, Nutrition and Consumer Services works to harness the Nation's agricultural abundance to end hunger and improve health in the United States. Its agencies administer federal domestic nutrition assistance programs. In addition, the Center for Nutrition Policy and Promotion links scientific research to the nutrition needs of consumers through science-based dietary guidance, nutrition policy coordination and nutrition education.

Application Roadmap or Strategy:

Supporting Documentation:

Food Safety (FS)

Food Safety ensures that the Nation's commercial supply of meat, poultry and egg products are safe, wholesome, properly labeled and packaged. This Mission Area also plays a key role in the President's Council on Food Safety. This Council is instrumental in coordinating a national food safety strategic plan among various partner agencies. This includes the Department of Health and Human Services and the Environmental Protection Agency.

Application Roadmap or Strategy:

Supporting Documentation:

Marketing and Regulatory Programs (MRP)

Marketing and Regulatory Programs facilitate domestic and international marketing of U.S. agricultural products and ensure the health and care of animals and plants. MRP agencies are active participants in setting national and international standards.

Application Roadmap or Strategy:

Supporting Documentation:

Natural Resources and Environment (NRE)

Natural Resources and Environment ensures the health of the land through sustainable management. Its agency works to prevent damage to natural resources and the environment, restore the resource base and promote good land management.

Application Roadmap or Strategy:

Supporting Documentation:

Research, Education and Economics (REE)

Research, Education and Economics is dedicated to the creation of a safe, sustainable, competitive U.S. food and fiber system. In addition, REE has a focus on strong communities, families and youth through integrated research, analysis and education.

Application Roadmap or Strategy:



ITSD 3 Year
Vision_v2 - REE.pdf

Supporting Documentation:

Rural Development (RD)

Rural Development is committed to helping improve the economy and quality of life in all of rural America. These improvements are measured by providing financial programs to support essential public facilities and services, housing, health clinics, emergency service facilities, electricity and telephone services. In addition, Rural Development promotes economic development by providing loans to businesses through banks and community-managed lending pools. While also assisting communities to participate in community empowerment programs.

Application Roadmap or Strategy:

Supporting Documentation – Executive Information Technology Investment Review Board – August 2020:



RD IT Investment
FINAL_Redacted.pdf

Trade and Foreign Agricultural Affairs (TFAA)

Trade and Foreign Agricultural Affairs' (TFAA) role is to provide our farmers and ranchers with opportunities to compete in the global marketplace. TFAA is the Department's lead on trade policy with the primary responsibility to ensure USDA speaks with a unified voice on agriculture issues domestically and abroad. Within TFAA, the Foreign Agricultural Service is the lead U.S. agency tasked with promoting exports of U.S. agricultural products through market intelligence, trade policy, trade capacity building and trade promotion programs. This work is performed by staff in Washington, D.C., as well as a global network of 93 offices covering 171 countries. Also, within TFAA, the U.S. Codex Office coordinates U.S. participation in the Codex Alimentarius Commission. This Commission is a United Nations body that sets international food standards while protecting consumer health and ensuring fair trade practices.

Application Roadmap or Strategy:

Supporting Documentation – Executive Information Technology Investment Review Board – August 2020:



New TFAA from
OCIO IT Briefing _v7

Departmental Administration (DA)

DA provides management leadership to ensure that USDA administrative programs, policies, advice and counsel meet the needs of USDA Mission Areas and Agencies. This leadership is consistent with laws and mandates. In addition, DA provides safe and efficient facilities to address customer questions and concerns.

Application Roadmap or Strategy:

The Offices in DA serve as the “nerve center” for USDA administrative programs which provide management leadership and policy guidance to Mission Areas, Agencies, employees, business partners, and visitors. The Departmental Administration Information Technology Office (DAITO) is a recent office established to support Departmental Administration, Staff Offices (DASO), and the Office of the Secretary in facilitating and securing IT solutions. These solutions will produce cost efficiencies and align with the enterprise services, policy and governance.

DAITO will first analyze and assess the entire DASO IT portfolio with regards to security compliance, capital planning and investment control before completing a full strategic plan. Full knowledge in these two areas will allow for a strategic approach and plan to be established. DAITO will inherit the Departments goals at every chance.

Initial goals and objectives are listed below providing a roadmap for Departmental Administration Information Technology Office (DAITO).

- Digitally transform our administrative services/resources to serve USDA employees;
- Enabling an on-line, cloud-enabled interaction to simplify access to common requests, employee self-service, digitizing form submissions and approval chains while strengthening the value of information provided to effectively improve employee services;
- Enabling the DASO to deliver effective internal services, improving customer experience to employees, business/program owners and mission areas;
- Automating processes to preserve employees for more valuable topics and improve customer service;
- Use USDA Shared Services and increasing service transparency;
- Secure systems and applications according to USDA policies and regulations;
- Consolidate capital planning and investment activities to reflect new management oversight

DAITO will support USDA in achieving a digital, data-driven, efficient, and customer-focused agenda.

Supporting Documentation:

For more detailed information on USDA Mission Areas and Agencies please see the following: [USDA Mission Areas](#) and [Departmental Management](#)

APPENDIX D: INNOVATION & EMERGING TECHNOLOGY

USDA Forest Service Law Enforcement and Investigations Vault (Axon – Evidence.com)

The USDA Forest Service Law Enforcement and Investigations' (LEI) directorate is developing a digital evidence storage tool called LEI Vault. LEI Vault is the USDA-Forest Service implementation of technology to meet the equipment inventory and data storage requirements that underlie the fielding of the Body Worn Cameras (BWC). Body-worn cameras are widely used by law enforcement agencies in the United States. They are worn principally by officers in the performance of duties that require open and direct contact with the public. BWCs are cameras with a microphone and internal data storage. They allow audio video footage, known as Digital Media Evidence (DME), to be stored and analyzed with compatible software. Cameras are typically designed to be located on an officer's chest or head but may also be configured to deploy with a weapon or to be triggered when a weapon is deployed.

LEI Vault leverages the FedRAMP-accredited cloud resources provided by Axon Evidence.com to store and manage law enforcement officers' digital evidence (such as camera footage and audio recordings of interviews) and to provide a central management console for associated products and devices. All data originate with and is consumed by authorized USDA FS LEI law enforcement personnel and staff. All data is subject to the USDA FS LEI organization policies in place to govern this data, to include privacy and organization-level security.

Figure 28: Axon Body Camera, represents the body camera developed by Axon.



Figure 28. Axon Body Camera

Artificial Intelligence – FarmBeats

FarmBeats is a project that aims to harness data and artificial intelligence to assist farmers cut costs, increase yields and sustainably grow crops that are more resilient to climate change. Crops and fields are outfitted with a network of high-tech sensors, drones, satellites and tractors which are part of a partnership between Microsoft and USDA. The USDA pilot is in the testing phase of the FarmBeats technology on two crop systems experiments. One is located at the 7,000-acre farm at the USDA's Beltsville Agriculture Research Center in Maryland. The second is located at Harborview Farms located in Rock Hall, Maryland.

This technology collects data from the sensors, drones, satellites and tractors that are located within the crops and fields. This data is then transmitted to cloud-based artificial intelligence models that provide a detailed picture of conditions on the farm. If a farm does not have internet access, FarmBeats transmits data via TV white spaces to an edge device at the farm and onto the Microsoft cloud. The TV white spaces are unused broadcasting frequencies between television channels.

The USDA FarmBeats technology is focused on cover crops, grown during the off-season to limit weeds, manage pests, prevent erosion and improve soil for the main crops. The sensors are measuring soil temperature, humidity and acidity. The sensors also track water levels in the soil, which help determine how much water is retained after increasingly common heavy rainfalls and in turn, inform water budgets for a growing season.

Figure 29: Harborview Farms, below represents an example of the FarmBeats sensors and satellite device used to track the health and growth of crops.



Figure 29. Harborview Farms

Data Center Optimization Initiative (DCOI) Portal

The DCOI Portal is a software tool used to capture the inventory and the financial data within each agency and mission area. This data being captured is used to identify the list of applications and hardware within each data center. In addition, the system status is also monitored until the cloud adoption and migration initiative is completed.

DCOI is a Federal mandate described as the following: requires agencies to develop and report on data center strategies to consolidate inefficient infrastructure, optimize existing facilities, improve security posture, achieve cost savings, and transition to more efficient infrastructure, such as cloud services and inter-agency shared services.

All data center infrastructure and services, including contracts for third-party data centers and services agency-wide, shall be managed by the agency CIO in a manner consistent with FITARA and OMB Memorandum M-15-14, "Management and Oversight of Information Technology." The agency CIO shall be responsible for implementing and measuring progress toward meeting the goals set forth in this memorandum.

Figure 30: USDA - Open Data Centers – Total Number of applications by Mission Area, represents a screenshot of one of the visualizations within the DCOI Portal.

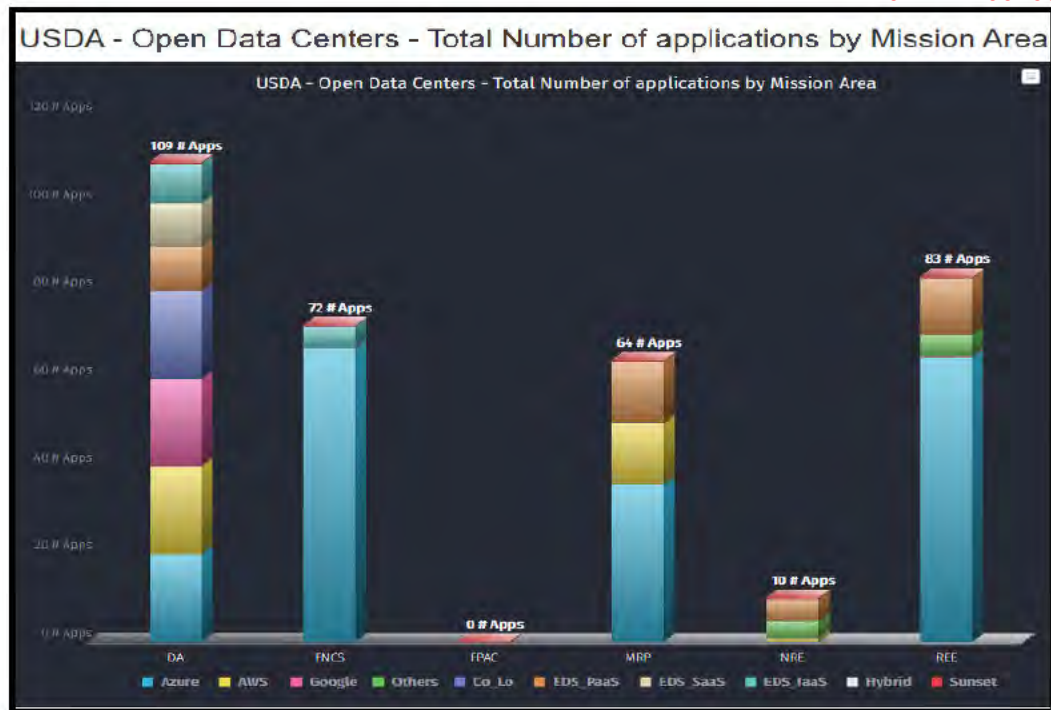


Figure 30. USDA – Open Data Centers – Total Number of Applications by Mission Area

Agricultural Transportation Open Data Platform - Socrata

The Socrata Data Platform is a cloud-based open data platform-as-a-service (PaaS) platform that breaks down government data silos. This platform has the ability to ingest, store and serve all variety of data workloads. The data workloads vary from small, static data to dynamic big data including real-time, sensor-based data emitted from Internet of Things and smart city sensors and devices. The Socrata platform can store structured or unstructured operational, geospatial, financial, and performance data and digital content like video footage.

The USDA Agricultural Marketing Service (AMS) – Transportation Services Division uses this tool to serve as the definitive source for economic analysis of agricultural transportation from farm to market. An essential part of that goal is to distribute data and analysis of agricultural transportation in an efficient and effective way, so that its stakeholders can extract as much value out of the data and resulting insights as possible. Using this open data platform will make the AMS – Transportation Services Division public data more discoverable, accessible, shareable, and usable. The expectation is that this tool will enhance collaboration around the data amongst internal and external stakeholders.

Figure 31: Bulk Grain Ocean Freight Rate Spreads, displays data that aligns with the cost of shipping grain from the U.S. Gulf and Pacific Northwest to Japan in dollars per metric ton.

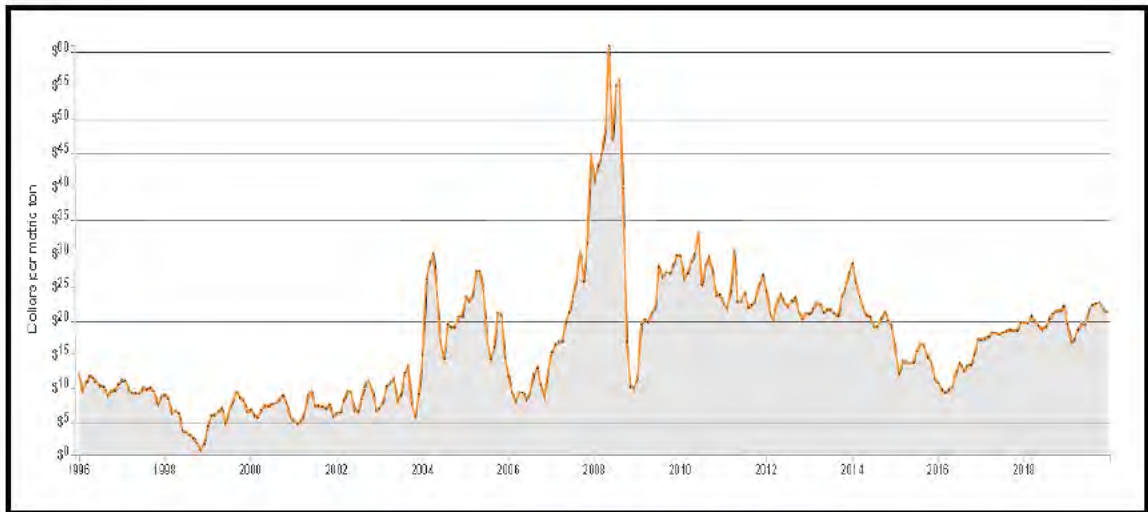
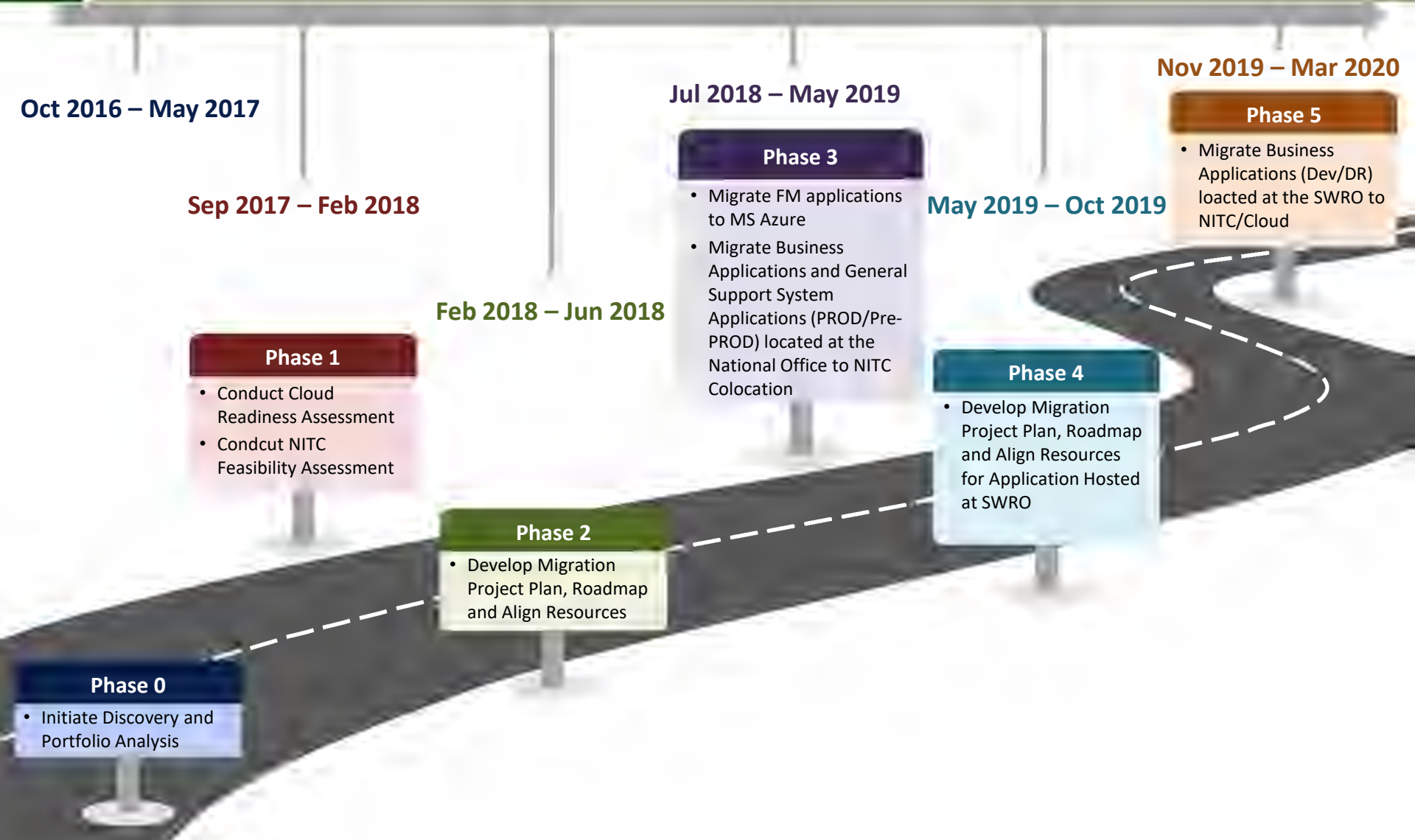


Figure 31. Bulk Grain Ocean Freight Rate Spreads

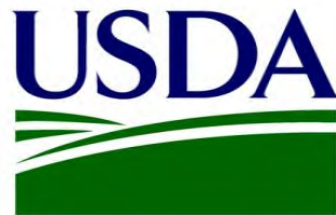
Date	Month	Year	Gulf_To_Japan	PNW_To_Japan	Gulf_PNW_Spread
December 2019	12	2019	\$46.83	\$25.50	\$21.33
November 2019	11	2019	\$47.08	\$25.25	\$21.83
October 2019	10	2019	\$50.85	\$28.10	\$22.75
September 2019	9	2019	\$52.06	\$29.50	\$22.56
August 2019	8	2019	\$50.35	\$28.00	\$22.35
July 2019	7	2019	\$47.75	\$26.19	\$21.56
June 2019	6	2019	\$43.19	\$23.81	\$19.38
May 2019	5	2019	\$43.10	\$23.55	\$19.55
April 2019	4	2019	\$42.06	\$23.31	\$18.75
March 2019	3	2019	\$40.63	\$23.31	\$17.32
February 2019	2	2019	\$38.94	\$22.13	\$16.81
January 2019	1	2019	\$43.00	\$23.50	\$19.50
December 2018	12	2018	\$48.00	\$25.83	\$22.17

Table 5. Bulk Grain Ocean Freight Rate Spreads



United States Department of Agriculture

Food and Nutrition Service



Office of Information Technology
Portfolio Management Division (PMD)

FNS National Office Data Center Disposition Plan

September 25, 2018

Contents

GLOSSARY	3
1. INTRODUCTION	4
1.1. PURPOSE OF DISPOSITION PLAN	4
1.2. NO DATA CENTER CLOSURE OVERVIEW	4
1.3. PLANNED DATE OF NO DATA CENTER CLOSURE	4
1.4. REASON FOR DATA CENTER CLOSURE	4
2. TRANSITION PLANNING	5
2.1. STAKEHOLDER IMPACT.....	5
2.2. SECURITY IMPACT	5
2.3. NOTIFICATIONS.....	5
3. SYSTEMS TARGETED FOR THE CLOUD	6
3.1. DATA DISPOSITION	6
3.2. SOFTWARE DISPOSITION	6
3.3. SYSTEM DOCUMENTATION DISPOSITION	6
3.4. EQUIPMENT DISPOSITION.....	6
APPENDIX A	7
APPROVALS/SIGNATURES	8

Glossary

Acronym	Description
ALERT	Anti-Fraud Locator using Electronic Benefits Transfer (EBT) Retailer Transactions
ATO	Authority To Operate
EBT	Electronic Benefits Transfer
FMAT	Financial Management Application Toolset
FNS	Food and Nutrition Service
FPRS	Food Programs Reporting System
GIMS	Grants Information Management System
GSS	General Support Services
IPT	Integrated Project Team
ISO	Information Security Office
MS	Microsoft
NDB	National Data Bank
NITC	National Information Technology Center
NO	National Office
NOEB	Network Operations and Engineering Branch
OFD	Operations Facilities Division
PMB	Portfolio Management Branch
ROAP	Regional Office Administered Program
SCOUT	State Systems' Comprehensive Outlook and Unified Tracker
SEIM	Security Event and Incident Management
STARS	Store Tracking and Redemption System
USDA	United States Department of Agriculture
WICTIP NG	Woman Infant Children The Integrity Profile Next Generation

1. Introduction

1.1. Purpose of Disposition Plan

The lease for the National Office (NO) at Park Center Drive will expire in May 2019 prompting the National office to relocate to a space at Braddock Road. FNS will not open a data center at this location, therefore, a data center migration is required. Other factors that were taken into consideration in planning this migration includes: The Department's mandate on Datacenter closures as well as efforts for Cloud and new technology adoption.

FNS is using Microsoft (MS) Azure Cloud services to migrate the Financial Management system to the Cloud. These applications are Financial Management Application Toolset (FMAT), Food Programs Reporting System (FPRS), Grants Information Management System (GIMS) and National Data Bank (NDB). Additionally, FNS designed a Co-Location solution to host 5 applications, including Anti-Fraud Locator using Electronic Benefits Transfer (EBT) Retailer Transactions (ALERT), Regional Office Administered Program (ROAP), State Systems' Comprehensive Outlook and Unified Tracker (SCOUT), Store Tracking and Redemption System (STARS) and Woman Infant Children The Integrity Profile Next Generation (WICTIP NG) as well as our Net General Support System (NetGSS).

1.2. NO Data Center Closure Overview

The FNS Alexandria, VA location provides telecommunication and systems support for users and systems. It encompasses applications and file and print servers and access to the United States Department of Agriculture (USDA) mail system. It provides the transport of data, voice, and video traffic over a framework of networking devices. It provides the infrastructure base for supporting the administrative functions of the various Food and Nutrition Service (FNS) offices, as well as providing system security support to dedicated FNS applications. After system migrations to the Cloud or National Information Technology Center (NITC) Co-Location, only print services and basic network access will be available to the end user at the physical location.

1.3. Planned Date of NO Data Center Closure

The planned date for the FNS National Office Datacenter is May 31, 2019.

1.4. Reason for Data Center Closure

The lease for the National Office at Park Center Drive will expire in May 2019 prompting the National office to relocate to space at Braddock Road. FNS will comply with the Department's guidance on datacenter closures and Cloud adoption, therefore, all applications hosted at the National Office will migrate to the Cloud or NITC Co-location.

Name	Title	Contact Phone Number	Contact Email
Joseph Shaw	OIT Project Manager	703-305-2504	Joseph.shaw@fns.usda.gov
Eli Miles	Vendor Project Manager	703-605-0870	Elihu.miles@fns.usda.gov
Vangie Cypher	Telecommunications Manager	703-305-2637	Vangie.Cypher@fns.usda.gov
Charlene Grundhoffer	Systems Manager	214-290-9850	Charlene.grundhoffer@fns.usda.gov
Tim Smith	Security Manager	703-305-2769	Tim.Smith@fns.usda.gov

2. Transition Planning

2.1. Stakeholder Impact

System migration impacts should be minimal. System migration will occur over a weekend with participation from vendor, system and network teams. All applications and systems will migrate to new hosting locations with no anticipated impact to the users.

2.2. Security Impact

System level accreditations will remain intact for applications housed at the NITC Co-Location. The FNS Cloud Environment will obtain an Authority To Operate (ATO) and all applications and systems will be accredited and inherit security controls from the Cloud Environment.

Risk Areas	Impact	Mitigation
Additional tools required to support the new environments at MS and NITC-KC	Delayed log retrieval and Incident response.	Build new forwarders to collect security event logs locally at new production sites. These logs will be compressed and sent over limited network circuits to our Security Event and Incident Management (SEIM).

2.3. Notifications

Established Cloud and Co-Location bi-weekly Integrated Project Teams (IPTs) to inform all stakeholders on migration plans and schedules. Stakeholders have provided individual project plans to synchronize with the integrated master schedule. The FNS Datacenter Migration workgroup is comprised of members from the FNS Telecom, Information Security Office (ISO), Network Operations and Engineering Branch (NOEB) and Portfolio

Management Branch (PMB) teams and we host bi-weekly meetings to discuss migration activities.

3. Systems Targeted for the Cloud

3.1. Data Disposition

All system data will be transferred with the systems during the migration. There are no plans to archive or delete any data. The system data will remain available to the users and other stakeholders in its current state.

3.2. Software Disposition

All system software will be part of the system migration.

3.3. System Documentation Disposition

All systems will be migrated to new hosting locations. There are no plans to disposal of any systems.

3.4. Equipment Disposition

The FNS Operations Facilities Division (OFD) team will dispose of equipment in the National Office Datacenter as part of the building move.

Appendix A

The plan will be updated as further information becomes available.

Approvals/Signatures

The undersigned acknowledge that they have reviewed the FNS National Office Decommissioning document and agree with the information presented within this document. Changes to this document will be coordinated with, and approved by, the undersigned, or their designated representatives.

Signature: _____ Date: _____
Print Name: Joe Shaw
Title: Program Manager
Role: National Office Datacenter Migration Project Manager

Signature: _____ Date: _____
Print Name: Kristin Ruiz
Title: Director, Portfolio Management Division
Role: FNS Chief Portfolio Officer

Signature: _____ Date: _____
Print Name: Kimberly Jackson
Title: Associate Chief Information Officer
Role: Organization's Approving Authority



FAS IT Systems Overarching Roadmap (Decommissioning and Cloud Adoption)

Updated Sept. 2018

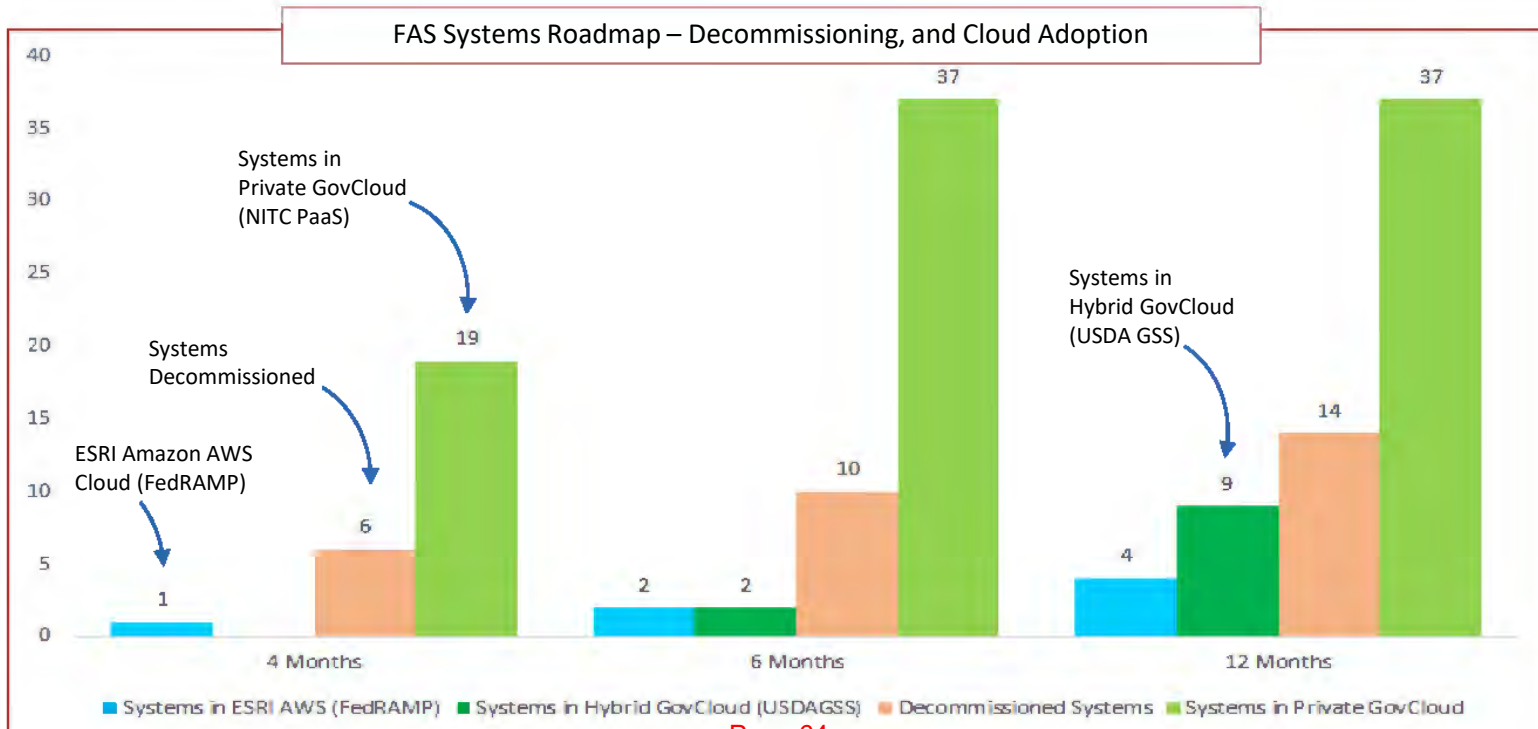
Topics

- Executive Summary
- Future plans and next steps
- FAS Systems Inventory
- Decommissioning of Systems
- Cloud Adoption and Timeframes
 - FAS Customer centric systems
 - FAS Mission centric systems
 - FAS Operations centric systems

Executive Summary

ISD develops, maintains and supports 60 systems that (1) deliver FAS Mission, (2) provide interfaces and information to FAS internal users, external partners, exporters & importers, corporations and farmers, and (3) caters to FAS Business Operations including reporting and governance.

In line with Department’s IT direction, ISD has developed an IT systems roadmap that caters to IT Modernization, and Cloud Adoption, as well as enables FAS to adopt initiatives such as applications rationalization. Below is a summarized depiction of systems that will be (a) decommissioned, and (b) moved to cloud environments. This also positions ISD to utilize adopting of enterprise services and platforms partnering with OCIO Digital Services Center, and CEC Client Experience Center (Formerly CTS). FAS ISD has adopted department guidelines and standards for its records management, data destruction, transfer, and protection of information during the decommissioning and cloud adoption process.



FAS ISD Roadmap – Current and Future Plans, and Timeframes

FAS Systems Cloud adoptions

- Private GovCloud
 - NITC PaaS services (Private GovCloud) - 4 to 6 months
- Commercial GovCloud
 - ESRI PaaS Amazon AWS (FedRAMP) - 6 to 8 months
- Hybrid GovCloud
 - USDA GSS Amazon AWS
 - USDA GSS Microsoft Azure - 8 to 12 months

FAS Systems decommissioning

- Application rationalization – 6 to 8 months
- Enterprise System adoption – 8 to 12 months

Enterprise Platforms adoption planning

- Dynamics CRM or Salesforce – 12 to 18 months
- Office 365 SharePoint – 8 to 12 months
- Analytics (Tableau or Power BI) – 6 to 8 months

Partnering with Department's services

- DSC and CEC



FAS Systems Inventory – Customer Centric Systems

Systems and/or Applications	Type of Application
Crop Condition Data Retrieval and Evaluation (CADRE)	Customer Centric
Crop Explorer (CE)	Customer Centric
Production Supply and Distribution (PSD External/Online)	Customer Centric
Global Agriculture & Disaster Assessment System (GADAS)	Customer Centric
Global Agricultural Monitoring (GLAM) -Collection of GIS Apps	Customer Centric
Knowledge Management System (KMS)	Customer Centric
Archive Explorer (AE)	Customer Centric
Press Release (Retired)	Customer Centric
Global Agricultural Information Network (GAIN External) Redesign in PaaS Cloud	Customer Centric
Customer Relationship Management (CRM)	Customer Centric
Export Sales Reporting & Query (ESR Query)	Customer Centric
Partner Contact Directory (PCD)	Customer Centric
Trade Lead System (TLS) (Previous named TDMS)	Customer Centric
Global Agricultural Trade System (GATS)	Customer Centric
Sugar Users Group Accounting, Reporting, and Scheduling System (SUGARS)	Customer Centric
Unified Export Strategy (UES)	Customer Centric
Food Aid Information System (FAIS)	Customer Centric
System for Tracking Agricultural Regulations (STAR) (Previously named SPS/TBT)	Customer Centric
Food and Safety Newsletter (integrated in STAR)	Customer Centric
FAS Public Website (Sharepoint/Drupal)	Customer Centric
AGX Event Calendar	Customer Centric
Agricultural Tariff Tracker (ATT)	Customer Centric



FAS Systems Inventory – Mission Centric Systems

Systems and/or Applications	Type of Application
Operational Reporting	Mission Centric
PIERS (Subscription)	Mission Centric
Production Supply and Distribution (PSD Internal)	Mission Centric
Overseas Budget Financial Plan (OBFP) (Ingest into iMART)	Mission Centric
Post Management Reports (PMR) (Ingest into iMART)	Mission Centric
Contact Lookup (Deprecated)	Mission Centric
Food Assistance and Agricultural Development Analysis System (FADAS)	Mission Centric
Compliance Automated Report Resource System (CARRS)	Mission Centric
Financial Plan (Ingest in iMART)	Mission Centric
Global Agricultural Information Network (GAIN Internal) - Redesign in PaaS Cloud	Mission Centric
Country Strategy Support Fund (CSSF)	Mission Centric
FASTRAK	Mission Centric
Food Aid Division System (FADS)	Mission Centric
Export Sales Reporting and Maintenance System (ESRMS)	Mission Centric
Dairy Import Licensing (DILS)	Mission Centric
Dairy Accelerated Importer Retrieval and Information Exchange System (DAIRIES)	Mission Centric
Multilateral Tariffs System (TARIFFS)	Mission Centric
International Activities and Financial Tracking System (IAFTS)	Mission Centric
Safeguard (Sheepmeat)	Mission Centric
International Technical and Regulatory Capacity Building Request Management (ITRCB) (APHIS)	Mission Centric
Civilian Response Tracking System (CRTS - Retired)	Mission Centric
Overseas Administrative Support Information System (OASIS)	Mission Centric
Overseas Directory Search (ODS)	Mission Centric
Overseas Directory Update (ODU)	Mission Centric
International Cable System (INCA)	Mission Centric



FAS Systems Inventory – Operations Centric Systems

Systems and/or Applications	Type of Application
Task Management System (TMS)	FAS Operations
Budget Administration and Tracking System (BATS)	FAS Operations
Management Budget Projection Reports (MBPR)	FAS Operations
SharePoint	FAS Operations
OATS	FAS Operations
Global Review	FAS Operations
Visa Requirements	FAS Operations
Consolidated Overseas Accountability Support Toolbox (COAST) Internal Database	FAS Operations
Integrated Management Administrative Resource Tool (iMART)	FAS Operations
Electronic Foreign Service Retirement System (EFSRS)	FAS Operations
Foreign Property Management Information System (FPMIS)	FAS Operations
International Passport and Travel Tracking System (IPATTS)	FAS Operations
Foreign Service Officer Appraisal System (FSO Appraisal)	FAS Operations
Foreign Service Officer Bidding System (FSO Bidding)	FAS Operations
Dairy Exporter Incentive Program (DEIP) (used for historical data and reporting)	FAS Operations



FAS Systems Planned for Decommission

Infra. Resources will be released or reused

Systems and/or Applications	Adopt Cloud OR Decommission	Timeframe (Months)
Operational Reporting	Decommission	6 to 8
Overseas Budget Financial Plan (OBFP) (Ingest into iMART)	Decommission	4 to 6
Post Management Reports (PMR) (Ingest into iMART)	Decommission	4 to 6
Contact Lookup (Depricated)	Decommission	4 to 6
Financial Plan (Ingest in iMART)	Decommission	6 to 8
Press Release (Retired)	Decommissioned	N/A
OATS	Decommission	6 to 8
Food Aid Division System (FADS)	Decommissioned	N/A
Civilian Response Tracking System (CRTS - Retired)	Decommissioned	N/A
Dairy Exporter Incentive Program (DEIP) (used for historical data and reporting)	Decommission	6 to 8

FAS Customer Centric Systems Planned for Cloud Adoption

Systems and/or Applications	Customer Centric, Mission or Enterprise	Transition, Decommission or Currently in Cloud	Timeframe (Months)
Crop Condition Data Retrieval and Evaluation (CADRE)	Customer Centric	Currently in Private GovCloud (NITC PaaS)	N/A
Crop Explorer (CE)	Customer Centric	Currently in Private GovCloud (NITC PaaS)	N/A
Production Supply and Distribution (PSD External/Online)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Global Agriculture & Disaster Assessment System (GADAS)	Customer Centric	Transition to ESRI Gov. AWS (FedRAMP)	6 to 8
Global Agricultural Monitoring (GLAM) -Collection of GIS Apps	Customer Centric	Transition to ESRI Gov. AWS (FedRAMP)	6 to 8
Knowledge Management System (KMS)	Customer Centric	Build in Hybrid Gov Cloud (USDA GSS Azure)	12 to 18
Archive Explorer (AE)	Customer Centric	Transition to ESRI Gov. AWS (FedRAMP)	6 to 8
Global Agricultural Information Network (GAIN External) Redesign in PaaS Cloud	Customer Centric	Build in Private GovCloud (NITC PaaS)	6 to 8
Customer Relationship Management (CRM)	Customer Centric	Transition to Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
Export Sales Reporting & Query (ESR Query)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Partner Contact Directory (PCD)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Trade Lead System (TLS) (Previous named TDMS)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Global Agricultural Trade System (GATS)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Sugar Users Group Accounting, Reporting, and Scheduling System (SUGARS)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Unified Export Strategy (UES)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Food Aid Information System (FAIS)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
System for Tracking Agricultural Regulations (STAR) (Previously named SPS/TBT)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Food and Safety Newsletter (integrated in STAR)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
FAS Public Website (Sharepoint/Drupal)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
AGX Event Calendar	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Agricultural Tariff Tracker (ATT)	Customer Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6

FAS Mission Centric Systems Planned for Cloud Adoption

Systems and/or Applications	Customer Centric, Mission or Enterprise	Transition, Decommission or Currently in Cloud	Timeframe (Months)
Food Assistance and Agricultural Development Analysis System (FADAS)	Mission Centric	Transition to ESRI Gov. AWS (FedRAMP)	8 to 12
Compliance Automated Report Resource System (CARRS)	Mission Centric	Transition to Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
Global Agricultural Information Network (GAIN Internal) Redesign in PaaS Cloud	Mission Centric	Build in Private GovCloud (NITC PaaS)	6 to 8
Country Strategy Support Fund (CSSF)	Mission Centric	Transition to Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
FASTRAK	Mission Centric	Transition to Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
Export Sales Reporting and Maintenance System (ESRMS)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Dairy Import Licensing (DILS)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Dairy Accelerated Importer Retrieval and Information Exchange System (DAIRIES)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Multilateral Tariffs System (TARIFFS)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
International Activities and Financial Tracking System (IAFTS)	Mission Centric	Build in Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
Safeguard (Sheepmeat)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
International Technical and Regulatory Capacity Building Request Management (ITRCB) (APHIS)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Overseas Administrative Support Information System (OASIS)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Overseas Directory Search (ODS)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
Overseas Directory Update (ODU)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6
International Cable System (INCA)	Mission Centric	Transition to Private GovCloud (NITC PaaS)	4 to 6

FAS Operations Centric Systems Planned for Cloud Adoption

Systems and/or Applications	Customer Centric, Mission or Enterprise	Transition, Decommission or Currently in Cloud	Timeframe (Months)
Task Management System (TMS)	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
Budget Administration and Tracking System (BATS)	FAS Operations	Transition to Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
Management Budget Projection Reports (MBPR)	FAS Operations	Transition to Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
SharePoint	FAS Operations	Transition to Hybrid Gov Cloud (USDA GSS Azure)	8 to 12
Global Review	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
Visa Requirements	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
Consolidated Overseas Accountability Support Toolbox (COAST) Internal Database	FAS Operations	Currently in Private GovCloud (NITC PaaS)	N/A
Integrated Management Administrative Resource Tool (IMART)	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
Electronic Foreign Service Retirement System (EFSRS)	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
Foreign Property Management Information System (FPMIS)	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
International Passport and Travel Tracking System (IPATTS)	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
Foreign Service Officer Appraisal System (FSO Appraisal)	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6
Foreign Service Officer Bidding System (FSO Bidding)	FAS Operations	Transition to Private GovCloud (NITC PaaS)	4 to 6



United States
Department of
Agriculture

Office of the General Counsel
1400 Independence Ave. SW
Washington, DC 20250-1400

December 2, 2021

Delivered via Electronic Mail

**Re: Second Interim Response for Freedom of Information Act (FOIA)
Request No. 2022-DA-00100-F**

This is a second interim response to the above-referenced FOIA request received by the U.S. Department of Agriculture (USDA), Office of Information Affairs (OIA). The request sought copies of certain records in the Office of the Chief Information Officer at USDA.

This office issued a first interim response in this matter on November 18, 2021.

Your request is being processed under the FOIA, 5 U.S.C. § 552.

A search for responsive records was conducted by the USDA Office of the Chief Information Officer (OCIO). Responsive records totaling fifteen (15) pages were identified.

The OIA continues to process your request and will issue a final response.

You may seek dispute resolution services from the OIA's FOIA Public Liaison, Mr. Harald Fuller-Bennett. Mr. Fuller-Bennett may be contacted by telephone at 202-239-4522, or electronically at Harald.FullerBennett@usda.gov or USDAFOIA@usda.gov.

You also have the option to seek assistance from the Office of Government Information Services (OGIS). Please visit <https://www.archives.gov/ogis/mediation-program/request-assistance> for information about how to request OGIS assistance in relation to a FOIA request.

If you have any questions regarding the processing of this request, please contact Ms. Susan Ruppel electronically at susan.ruppel@usda.gov or USDAFOIA@usda.gov.

For additional information regarding USDA FOIA regulations and processes, please refer to the information available online at [Freedom of Information Act Division | USDA](#).

The OIA appreciates your patience as we continue processing the remainder of your FOIA request.

Sincerely,

Alexis R. Graves

Alexis R. Graves

Director

Office of Information Affairs

Enclosure: Responsive Records (15 pages)

MRP Cloud Migration and Data Center Optimization Plan



Agricultural Marketing Service

Creating Opportunities for Farmers and Businesses

Agenda

- Introductions
- Project Overview
- Centers of Excellence (CoE) Engagement
- Subgroup Updates
- Delivery Date Proposal
- Decommissioning and Records Management
- Next Steps
- Closing Remarks

Project Plan Overview

- Tasks for completion by December 2019
 - Instantiate Dev/Test and Production IaaS Environment
 - Consolidate AMS and APHIS Networks
 - Categorize, enhance and migrate applications
 - Governance and Licensing
 - Security Updates
- Engagement with Cloud Adoption, Infrastructure Optimization and Customer Experience CoEs
- Subgroups: Network, Governance, Contracting, Applications, Licensing and Security
- Next Steps

Agricultural Marketing Service

Creating Opportunities for Farmers and Businesses

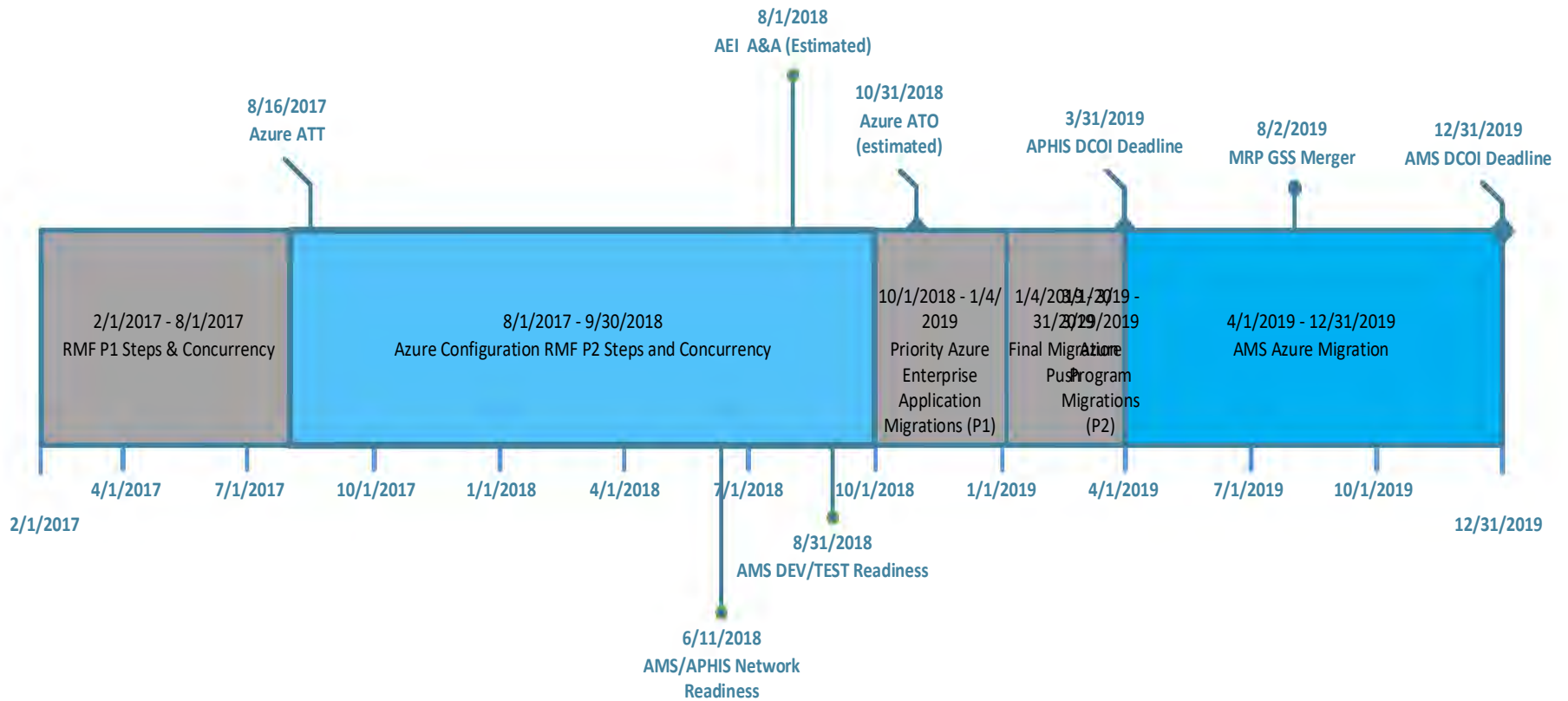
Roadmap for MRP Cloud Migration and DCOI

RoadMap MRP Cloud Migration and DCOI	Start of Contract - 12/28/2018	01/02/2019 - 05/31/2019	06/01/2019 - 12/31/2019
Phase 1: Instantiation of Services and Application Migration (Lift and Shift) in Dev/Test, Retire Dev/Test Servers	X		
Phase 2: Instantiation of Services and Application Migration (Lift and Shift) in Production, Retire Subset of Production Servers		X	
Phase 3: Application Migration (needs minor changes) in Dev/Test and Production, Operational Execution and Management, Transition of O&M to USDA resources, and Retire additional Production Servers			X

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MRP Cloud Timeline (Patrick McFall)



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Centers of Excellence (CoE) Support (Doug Nash & David Marsh)

Cloud Adoption	Infrastructure Optimization	Customer Experience
<p>Security and Compliance - Assist with Compliance Architecture for AMS using APHIS MAG GSS</p>	<p>Assess, analyze costs and assist in developing a disposition plan for applications requiring significant enhancements for migration</p>	<p>Advise on Specialty Crop Inspection System Modernization</p>
<p>Licensing and Cost Assessment - Analyze and assess licensing and hosting costs on Azure for AMS applications</p>	<p>Provide online modules and digital Training packages for Azure and Cloud</p>	<p>Advise on Export Subcommittee e-Certificate Portal Options</p>
<p>Azure setup, Governance and platform – Assist with “White-glove” support and guidance</p>	<p>Assist in finalizing the authoritative list of applications, servers and software licenses</p>	
<p>Application Migration and Connectivity - Assist with “White-glove” support and guidance</p>		

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MRP Cloud Summary (Patrick McFall)

Cloud Migration Application Migration Subgroup	Duration	Status
1. RMF P1 Steps & Concurrency	02/01/2017 – 08/01/2017	100% Completed
2. Azure Configuration RMF P2 Steps & Concurrency	08/01/2017 – 09/30/2018	55% Completed
4. Azure Enterprise Application Migrations (P1) <ul style="list-style-type: none"> • Azure ATO • AMS/APHIS Network Readiness • AMS DEV/TST Readiness 	10/01/2018 – 01/04/2019	0% Completed
5. Final Migration Push <ul style="list-style-type: none"> • APHIS DCOI Deadline 	01/04/2019 – 03/31/2019	0% Complete
6. AMS Azure Migration <ul style="list-style-type: none"> • MRP GSS Merger • AMS DCOI Deadline 	04/01/2019 – 12/31/2019	0% Complete

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Subgroup 1: Network Integration (Lisa Dukeman)

Cloud Migration Network Integration	Duration	Status	CoE Involvement
1. Design for Dev/Test and Production (Phase 2)	5/4/2018 – 5/22/2018	Complete	
2. Implement Network Interconnection for Dev/Test and Production (Phase 2)	5/11/2018 – 5/18/2018	Complete	
3. Provide Network Testing of Interconnection (Dev/Test and Production)	6/18/2018 – 6/23/2018	Complete	
4. Identify Licensing Model and licensing transition strategy for each Software	6/18/2018 - 7/20/2018	Complete	
5. Complete AMS/APHIS Network Connectivity	TBD	Pending	
Provide AMS VRF in Ft Collins and Riverdale, Update AMS routers to APHIS standard configuration, AMS sites reconfigured with APHIS DHCP and DNS servers, AMS sites reconfigured for management in APHIS Solar winds	Pending Dates for subtasks		

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Subgroup 2: Azure Governance & Platform Setup (Lisa Dukeman)

Cloud Migration Azure Setup / Governance Subgroup	Duration	Status	CoE Involvement
1. List of Servers to migrate to Azure – 74 Servers (Dev/Test and Prod)	06/11/18 – 07/06/18	Complete	
2. Setup Azure VMs, SQL Azure and Governance in Dev/Test for initial Migration	07/02/2018 – 7/29/2018	Complete	Yes
3. Migrate Azure VMs, setup Governance in Dev/Test for Final Migration, and decommission Dev/Test servers	09/03/2018 – 12/31/2018	Pending	Yes
4. Migrate Azure VMs and setup Governance in Prod	01/02/2019 - 12/31/2019	Pending	Yes
5. Migrate Azure VMs and setup Governance in Production - Applications with Minor Changes, and decommission Production Servers	06/01/2019 – 11/15/2019	Pending	
6. Implement Technical Landscape Strategies for Platforms, PAAS Services, other	09/03/2018 - 12/31/2018	Pending	

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Subgroup 3: Contracting / Planning (Renee Gore)

Cloud Migration Contracting / Planning Subgroup	Duration	Status	CoE Involvement
1. Establish MRP (APHIS / AMS) Project , Subgroups, Consolidated Plan, rules of engagement and OPPM Contact	05/14/18 – 06/29/18	Complete	
2. Complete AMS Task Order under APHIS Contract and obtain approval	05/07/2018 – 05/16/2018	Complete	
3. Facilitate engagement of Cloud Adoption and Infrastructure Optimization CoE	06/06/2018 – 7/11/2018	Complete	Yes
4. Complete DLCC / Re-baseline request, AAR Documentation and Cover Memo	06/06/2018 – 7/26/2018	Complete	
5. Obtain Department Approval for AAR	07/27/2018 – 08/15/2018	Pending	
6. Complete Acquisition Steps and fast track Contract Award	08/15/2018 – 08/24/2018	Pending	
7. On-going Oversight and Facilitation for delivery of Subgroup/project Charter in coordination with MRP/APHIS, CoE, MRP/AMS and Contractors	05/14/2018 - 12/31/2019	On-going	

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Subgroup 4: Application Migration (Renee Gore)

Cloud Migration Application Migration Subgroup	Duration	Status	CoE Involvement
1. Develop Application List and categorize as: Cloud ready, Not Cloud Ready, or Unknown	06/18/2018 – 7/17/2018	Complete	
2. Migrate subset of applications by category to test: OID, eTDE, eDOCS & DBIGS	07/30/2018 – 8/30/2018	50% Complete	Yes
3. Migrate Dynamics CRM to test: CEMS, ePVP, CA Case Management	09/03/2018 – 10/31/2018	Pending	Yes
4. Phase I: Migrate Cloud Ready Applications to Production	01/02/2019 - 4/29/2019	Pending	
5. Phase II: Refactor applications requiring minor enhancements and migrate to Production	06/01/2019 – 11/29/2019	Pending	
6. Phase III: Determine disposition of applications requiring major enhancements, modernize needed applications, and decommission applications not migrating)	09/03/2019 - 12/31/2019	Pending	
6. Operational Execution and Management, and Transition of O&M to USDA resources	09/03/2019 - 12/31/2019	Pending	

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Subgroup 5: Licensing (Dan Knight)

Cloud Migration Licensing Subgroup	Duration	Status	COE Involvement
1. Identify Servers in Dev/Test and Production	4/16/2018 – 7/10/2018	Complete	
2. Identify Software moving to Azure (Including COTS)	6/18/2018 – 7/10/2018	90% Complete	
3. Provide Azure Cost Estimates	6/18/2018 – 7/19/2018	Complete	Yes
4. Identify Licensing Model and licensing transition strategy for each Software	6/18/2018 - 7/20/2018	40% Complete	Yes
5. Provide Strategy for software licensing for Dev/Test and Production in Azure Cloud	6/18/2018 - 8/17/2018	40% Complete	Yes
6. AMS, APHIS and Contractors Collaborate on opportunities to share Licenses	8/17/2018 - 8/31/2018	Pending	



Subgroup 6: Security (Dan Knight)

Cloud Migration Licensing Subgroup	Duration	Status	CoE Involvement
1. Expand and Extend APHIS ATT for AMS Test Applications	4/16/18 – 12/31/2018	Completed	
2. Network Interconnection Security Agreement (ISA)	5/16/18 – 7/15/18	Completed	
3. Review of Applications and Systems that have and need ATO's.	8/27/2018 - 9/07/2018	Pending Review of PTA's for data categorization of existing systems. Pending review of newly identified applications that potentially need to be assessed.	Yes
4. MRP Azure Production ATO	9/15/2018 - 11/15/2018	Pending	Yes
5. AMS ATO Completion to be compliant with migration to the Cloud (updates to existing systems, authorization of new systems identified) .	9/10/2018 - 12/31/2019	Pending	
6. Consolidated Network or MRP Enterprise Infrastructure ATO	01/01/2019 – 06/31/2019	Pending	
7. Manage compliance in AMS and APHIS	05/16/2018 – 12/31/2019	On going	



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Creating Opportunities for Farmers and Businesses

Decommissioning and Records Management

- A separate plan will be developed for each legacy MRP IT system identified for decommissioning.
- The decommissioning plan will be built based on the a common work breakdown structure template, to ensure all critical tasks are included in the final decommissioning plan.
- Each decommissioning plan will include at least the following key sub-plans:
 - Communications Plan: to ensure users and stakeholders are informed of the decommissioning in a timely manner.
 - Records Disposition Plan: to ensure appropriate management of records from the decommissioned system, in accordance with published records dispositions schedules.
 - Resource Reuse and Disposal Plan: to plan for the continued benefit of repurposed resources or the final disposition of unsalvageable resources.



Agricultural Marketing Service

Creating Opportunities for Farmers and Businesses

Next Steps and Closing Remarks



United States
Department of
Agriculture

Office of the General Counsel
1400 Independence Ave. SW
Washington, DC 20250-1400

December 30, 2021

Delivered via Electronic Mail

Re: Third Interim Response for Freedom of Information Act (FOIA) Request No. 2022-DA-00100-F

This is a third interim response to the above-referenced FOIA request received by the U.S. Department of Agriculture (USDA), Office of Information Affairs (OIA). The request sought copies of certain records in the Office of the Chief Information Officer at USDA.

This office issued a first interim response in this matter on November 18, 2021 and a second interim response on December 2, 2021.

Your request is being processed under the FOIA, 5 U.S.C. § 552.

A search for responsive records was conducted by the USDA Office of the Chief Information Officer (OCIO). Responsive records totaling two (2) pages were identified.

The OIA continues processing your request and will issue a final response.

You may seek dispute resolution services from the OIA's FOIA Public Liaison, Mr. Harald Fuller-Bennett. Mr. Fuller-Bennett may be contacted by telephone at 202-239-4522, or electronically at Harald.FullerBennett@usda.gov or USDAFOIA@usda.gov.

You also have the option to seek assistance from the Office of Government Information Services (OGIS). Please visit <https://www.archives.gov/ogis/mediation-program/request-assistance> for information about how to request OGIS assistance in relation to a FOIA request.

If you have any questions regarding the processing of this request, please contact Ms. Susan Ruppel electronically at susan.ruppel@usda.gov or USDAFOIA@usda.gov.

For additional information regarding USDA FOIA regulations and processes, please refer to the information available online at [Freedom of Information Act Division | USDA](#).

The OIA appreciates your patience as we continue processing the remainder of your FOIA request.

Sincerely,

Alexis R. Graves

Alexis R. Graves
Director
Office of Information Affairs

Enclosure: Responsive Records (2 pages)

Overarching legacy IT system decommissioning plan

Modernization Plan

The table below shows Rural Development’s plan for decommissioning older systems and transition to the cloud using modernized systems.

System Name	Cloud	Decommission	How system will be transitioned/decommissioned?	Target Date
Drupal	Yes	Yes	The RD internet Drupal will migrate to Department Drupal 8 platform in alignment with the Website Modernization Strategy.	FY 2019
Stellent	No	Yes	RD applications using Stellent will be migrated to the Electronic Customer File (ECF) platform. ECF is hosted in NITC.	FY 2019
Doc Factory	Yes	Yes	Doc Factory will be transitioned to SpringCM. Doc Factory will then be decommissioned.	FY 2020
UniFi	Yes	Yes	UniFi will be replaced by a solution leveraging the Broadband Pilot Intake solution, which uses the Salesforce Cloud. RD expects that the resulting solution will be a hybrid solution.	FY 2020
Guaranteed Underwriting System (GUS)	Yes	Yes	GUS will be replaced by a solution leveraging the Broadband Pilot Intake solution, which uses the Salesforce Cloud. RD expects that the resulting solution will be a hybrid solution.	FY 2020
Automated Multi-Housing Accounting System (AMAS)	Yes	Yes	AMAS will be replaced by a solution leveraging the Broadband Pilot Intake solution, which uses the Salesforce Cloud. RD expects that the resulting solution will be a hybrid solution.	FY 2020
Electrofiche	Yes	Yes	This will be replaced by functionality in the Salesforce Cloud.	FY 2019

Overarching legacy IT system decommissioning plan

System Name	Cloud	Decommission	How system will be transitioned/decommissioned?	Target Date
File Storage and Data Migration	Yes	Yes	RD will migrate existing 25 Terabytes of files to SpringCM as well as associated workflows in the existing ECF system.	FY 2020

Records Management

To manage records, Rural Development follows:

- National Archives and Records Administration (NARA) “Use Cases for Electronic Messages” for selecting and integrating solutions;
- National Institute of Standards and Technology (NIST) guidance and proven cybersecurity best practices for data collection, transfer, records management, protection, and data destruction; and
- Specific records retention requirements such as
 - CFR Title 12, Chapter X, Part 1026, Subpart D, Section 1026.25 for retention of all loan origination records, which is 3 years after funding (consummation) of the loan;
 - Truth-in-Lending Act (“TILA”) and the Real Estate Settlement Procedures Act (“RESPA”) Integrated Disclosure Rule, for 5 years;
 - Escrow closing notices for two years; and
 - HB-1-355 SFH Guaranteed Loan Program Technical Handbook.

When data is moving between security boundaries, RD will continue employing Transport Level Security and adhere to BOD 18-01.

The replacement solutions or those migrated to the cloud will employ roles-based enterprise data masking, FIPS standards for data-at-rest encryption and use FedRAMP certified cloud service providers. RD expects solution providers will include Salesforce and SpringCM.

When data needs to be destroyed, RD will handle disposal based on a designated level of sensitivity (PII, CUI, etc.) as defined in NIST Special Publication 800-88, Revision 1: Guidelines for Media Sanitization.



United States
Department of
Agriculture

Office of the General Counsel
1400 Independence Ave. SW
Washington, DC 20250-1400

March 3, 2022

Delivered via Electronic Mail

Re: Final Response for Freedom of Information Act (FOIA) Request No. 2022-DA-00100-F

This is the Office of Information Affairs' (OIA) final response to the above-referenced FOIA request, which sought “[a] copy of the following records in the Office of the Chief Information Officer at USDA:

- 1) APHIS IT Roadmap 2018,
- 2) FNCS Data Center and Cloud Migration Roadmap,
- 3) FNS National Office Decommissioning Plan, September 28, 2018,
- 4) MRP Cloud Migration and Data Center Optimization Plan,
- 5) Overarching FAS IT Systems Roadmap, September 28, 2018,
- 6) RD Response - Overarching legacy system Decommissioning Plan, September 30, 2018 and
- 7) USDA Target Architecture Plan 2018.”

On November 17, 2021, you agreed to accept the 2021 version of the USDA Target Architecture Plan in lieu of the 2018 version.

On November 18, 2021, December 2, 2021, and December 30, 2021, this office issued interim responses in this matter.

Your request has been processed under the FOIA, 5 U.S.C. § 552.

A search for responsive records was conducted by the USDA Office of the Chief Information Officer (OCIO). Responsive records totaling eighty-six (86) pages were identified.

You may appeal this response by email at USDAFOIA@usda.gov. Your appeal must be in writing, and it must be received electronically no later than 90 calendar days from the date of this letter. The OGC will not consider appeals received after the 90 calendar-day limit. Appeals received after 5:00 p.m. EST will be considered received the next business day. The appeal letter should include the FOIA tracking number, a copy of the original request, the OIA's response to your original request, and a statement explaining the basis of your appeal. For quickest possible handling, the subject line of your email and the appeal letter should be marked “Freedom of Information Act Appeal” and reference FOIA No. 2022-DA-00100-F.

United States Department of Agriculture
Animal and Plant Health Inspection Service

Information Technology Roadmap 2018

Version Control

Version	Date	Comment
1.0	9/24/2014	First release
2.0	9/30/2016	2017 update
3.0	11/30/2017	2018 update

Executive Summary

APHIS places an emphasis on information technology (IT) program management, acquisition, and governance. Centralization of decision-making over modernization of IT systems and applications, adoption of shared services, migration to commercial cloud services, and implementation of data management activities, are several notable IT achievements.

The *APHIS IT Roadmap* for fiscal year (FY) 2018 reflects the continued evolution of IT portfolio management in APHIS and its expectations for progress in IT strategic direction, infrastructure performance, and IT application modernization.

Recent milestones include establishment of an APHIS-wide geospatial workgroup tasked with identifying geographic information systems (GIS) used by program offices and migration of applications and services to the Esri cloud service, hosted on Amazon Web Services (AWS) cloud. The transition will enable broad adoption of GIS data collection by APHIS field staff, use of the data by analysts, and be a means to commonly deliver geographical information and mapping for systems.

Furthermore, APHIS joined a USDA-wide project to pilot the newly formed Commercial Cloud Service Brokerage for cloud-based services where Microsoft Azure is initially being made available. Adoption of the Azure cloud platform will contribute to continued migration of common services from agency data centers to cloud providers.

Close collaboration with other USDA agencies will continue to prove beneficial as APHIS works with the Agricultural Research Service (ARS) and Forest Service (FS) in several areas that include big data, shared services, and other critical areas.

Table of Contents

Version Control.....	ii
Executive Summary	iii
Introduction.....	1
Overview of Enterprise Architecture Roadmaps	1
Scope	2
Maintenance of the APHIS IT Roadmap	2
Mission of APHIS	3
APHIS Lines of Business.....	4
Strategic IT Direction	5
IT Trends and Influences.....	5
2018 (Exploit and Optimize Time Horizon).....	6
2019 – 2020 (Technology Insertion Time Horizon).....	7
2021 – 2024 (Emerging Technology Time Horizon)	8
APHIS To-Do List for Big Picture Trends.....	10
Through 2020	10
Tactical Actions - 2017 – 2018.....	11
Summary	12
Technology Insertion - 2019 – 2020.....	12
Summary	13
2020 Action Plan: Things to Do Tomorrow	13
Emerging Technology - 2021 – 2024	13
Summary	15
IT Portfolio and Project Governance	16
Strategy	16
Shared Services	18
Strategy	19
Cloud Computing.....	20
APHIS Cloud Computing Vision and Mission	20
APHIS Cloud Computing Context and Current Situation.....	20
Strategy	23
Driving Forces	24
Operational Support.....	24
Security	24

Cloud First Security via Cloud Architecture Security Broker (CASB).....	25
Multiple Cloud Services	25
Commercial Cloud Providers and Offerings	27
SpringCM Content Management Cloud Service	28
Azure Cloud.....	28
IT Infrastructure Optimization.....	29
Network Optimization.....	29
Challenge.....	30
Strategy.....	30
Data Center Optimization Initiative	30
Strategy.....	30
vBrick FedRAMP Authorization.....	31
Data Management.....	32
Geospatial Applications	32
Background.....	32
Challenges	33
Alignment to APHIS IT Strategic Plan.....	33
Requirements and Schedule.....	34
Strategy.....	35
Big Data.....	35
Challenges	37
Strategy.....	39
Next Steps.....	39
Data Warehouse	40
Strategy.....	41
Maintenance of APHIS Enterprise Infrastructure.....	42
APHIS Server Infrastructure Architecture	42
Server Platforms	42
Operating systems	42
Server Virtualization.....	43
Server Management Suites	43
Server Lifecycle Support.....	43
Core Services.....	43
Data Services	43

End User Computing.....	44
Directory Services.....	45
Technology Platforms.....	45
Database Platforms	45
Virtualization Platforms.....	45
Application Platforms	45
Telecommunication Services	46
Network Engineering Services	46
Advanced Technology Services	46
Voice over IP & Video	47
Network Architecture.....	47
Security Architecture	49
APHIS IT Systems.....	50
Challenges	51
Strategic Direction of IT Systems and Applications.....	52
Significant IT System Initiatives.....	52
Issuance of Authorizations – Permits, Licenses, etc.	53
Overview.....	53
Challenges.....	54
APHIS eFile	55
Strategy	56
Agriculture Quarantine Activities	56
Challenges.....	57
Alignment to APHIS IT Strategic Plan.....	58
Requirements and Schedule.....	58
Agriculture and Environment Protection.....	59
Overview.....	59
Challenges.....	60
Target Solution.....	60
Requirements and Schedule.....	61
Appendices.....	63
Appendix 1: Glossary.....	63

Appendix 2: Acronyms	65
Appendix 3: APHIS Strategic Goals and Objectives	69
Appendix 4: APHIS Portfolio of Information Technology Investments and Systems	71
Appendix 5: Legacy IT systems providing CARPOL capabilities	73
Appendix 6: IT Investments Funding Cooperative Agreements.....	75
Appendix 7: Geospatial Applications	76
Appendix 8: References	78

Table of Figures

Figure 1. Components of EA Roadmap.....	1
Figure 2. Relationships among consolidated reference models.....	2
Figure 3. APHIS lines of business	4
Figure 4. IT trends with potential impact on APHIS	5
Figure 5. APHIS action items through 2020.....	11
Figure 6. Emerging technologies of potential interest	14
Figure 7: OMB’s concept for IT shared services.....	18
Figure 8: Distribution of APHIS employees within the US and its territories	29
Figure 9. Cloud GIS structure.....	33
Figure 10. ARS SCINet Architecture	36
Figure 11. APHIS Hybrid Cloud	38
Figure 12. Proposed solution architecture	41
Figure 13. Storage and data protection hardware	44
Figure 14. Storage and data protection software	44
Figure 15. VTC architecture strategy.....	46
Figure 16. UHF/VHF radio architecture strategy	47
Figure 17. Network architecture strategy.....	48
Figure 18. Connectivity Strategy	48
Figure 19. Network security architecture strategy	49
Figure 20. Legacy IT system age distribution	51
Figure 21. Spending on IT systems.....	52
Figure 22. PPQ cargo inspection scenario	58
Figure 23. WMS concept overview	61

Introduction

The APHIS IT community continually reviews trends in IT and weighs the potential benefits that could be realized through adoption of shared services and new technologies that have been shown to be of value to APHIS.

APHIS maintains a portfolio of active IT investments and associated systems aligned to strategic goals and are critical to the agency's program offices as they fulfil their missions. Strategically, APHIS is focused on expansion of shared services such as cloud-based solutions, intra-USDA solutions, and blanket purchase agreements (BPAs). These will be important players as the agency moves forward on significant IT modernization activities, geographic information systems (GIS), and data standardization and integration.

Overview of Enterprise Architecture Roadmaps

In May 2012, the Office of Management and Budget (OMB) published the *Common Approach to Federal Enterprise Architecture*¹ (Common Approach) that provides an overall framework for enterprise architecture (EA) in the Federal government.

According to the Common Approach, each agency has one EA roadmap, and one transition plan with two views for each architecture project.

Enterprise IT Roadmap

- Current Views
- Future Views
- Transition Plan

The roadmap, plan, and views provide a picture of the architecture in terms of what exists currently, what is planned for the future, and the transition paths to be taken to achieve the future architecture.

The EA roadmap documents and maps the organization's strategic goals to business services, integrating technology solutions across all of the agency's lines of business. It discusses the overall EA approach and identifies performance gaps, resource requirements, planned solutions, transition plans, and a summary of the current and future architecture. It also describes the EA governance process, implementation

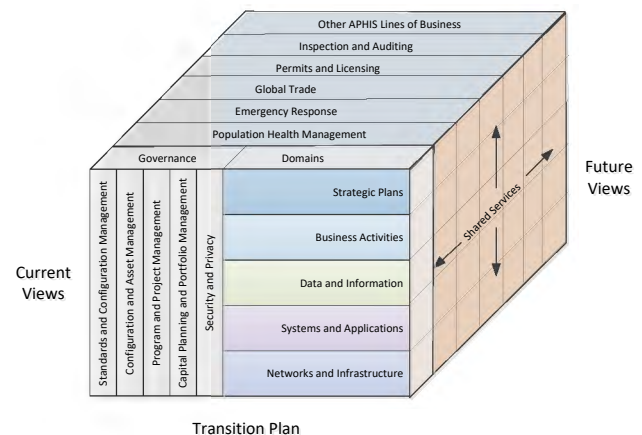


Figure 1. Components of EA Roadmap

¹ *Common Approach* and other documents issued by OMB and USDA as well as additional EA information are available on the APHIS EA SharePoint site at:

<http://sp.we.aphis.gov/MRPBS/ITD/Councils/EA/SitePages/Home.aspx>

methodology, and documentation framework. As a living document, it's updated at regular intervals (at least annually) to provide clear version control for changes in current and future views of agency changes at all levels of scope.

In January 2013, OMB released the second edition of the Federal Enterprise Architecture Framework (FEAF-II) that includes a suite of tools to implement the Common Approach, including the Consolidated Reference Model (CRM).

The CRM is comprised of six interrelated reference models that support analysis of an agency's IT portfolio and the identification of redundancies, gaps, and opportunities.

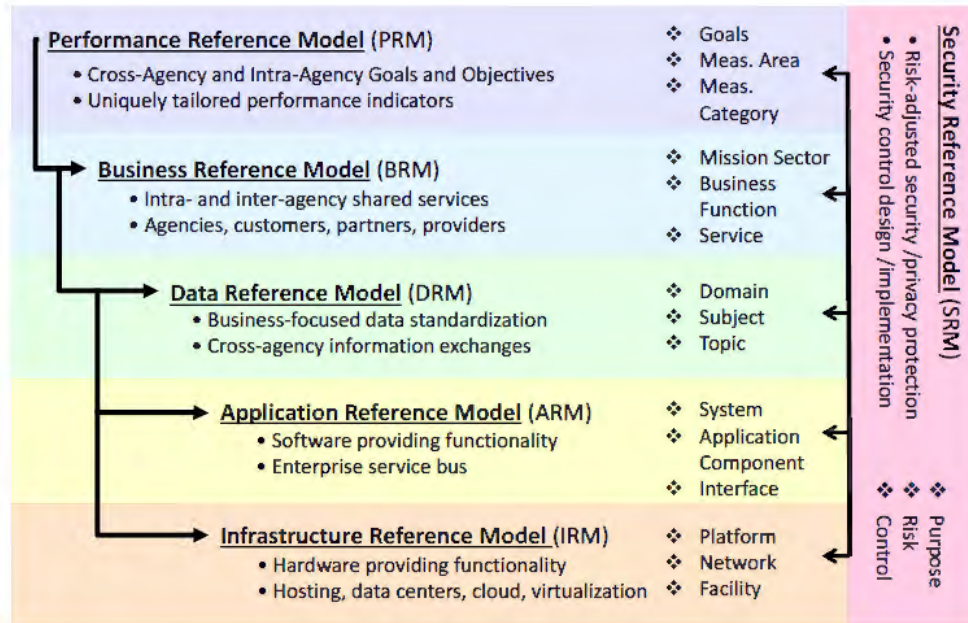


Figure 2. Relationships among consolidated reference models

The EA roadmap provides linkage of EA to other management and technology processes and serves as an authoritative reference for information technology (IT) portfolio reviews using the PortfolioStat methods/tools and for program-level analysis and planning.

Scope

For APHIS, this IT Roadmap serves as the agency's EA Roadmap to present a comprehensive view of its strategic IT direction and the implementation of targeted technologies in its IT investment portfolio comprised of systems and applications. Furthermore, it describes significant initiatives, governance processes to oversee implementation activities, and key tools used by the IT community to facilitate their work.

Maintenance of the APHIS IT Roadmap

The APHIS IT Roadmap as presented in this document reflects a point-in-time snapshot of the direction of IT in APHIS. In order to provide APHIS operational programs and their IT organizations with up-to-date information, the APHIS Chief Technology Officer (CTO) and Chief Enterprise Architect (CEA) maintain a [SharePoint site](#) that provides the status of target technologies and lists software and platforms that are being phased out.

The IT Roadmap will be updated and reissued annually by the CTO and CEA, with reviews by the APHIS IT Leadership Advisory Council (ITLAC) and the Technical Review Board (TRB).

Mission of APHIS

The agency's mission is to protect the health, welfare, and value of American agriculture and natural resources. Appendix 3 lists the strategic goals and initiatives presented in the *APHIS Strategic Plan 2015-2019*.

Fulfillment of the APHIS IT strategic goals and objectives will provide the agency's business programs and stakeholders with improved automated tools; and reliable, accurate, and shareable data supported by a high-performance, secure IT infrastructure. In support of its FY 2015-2019 Strategic Plan, APHIS has identified the following goals and objectives that will guide the agency's IT activities through FY 2019.

Goal 1: Provide all APHIS employees with the same quality of IT support, no matter where they work organizationally or geographically	Objective 1.1: Improve connectivity for employees in remote locations
	Objective 1.2: Provide the IT tools appropriate to support each employee's job
	Objective 1.3: Provide a high level of customer service response to each APHIS employee
Goal 2: Enhance technology to better serve our customers	Objective 2.1: Increase availability of information
	Objective 2.2: Improve delivery of services
	Objective 2.3: Increase mobile computing capabilities
Goal 3: Unify delivery of IT products and services	Objective 3.1: Unify disparate data sources
	Objective 3.2: Modernize unified communications strategy
	Objective 3.3: Promote delivery of -multi-agency shared services
	Objective 3.4: Refine and expand use of enterprise data taxonomy
Goal 4: Secure APHIS IT data and systems	Objective 4.1: Consistently apply security and privacy principles across the Agency

	Objective 4.2: Provide business intelligence security capabilities for executive review
	Objective 4.3: Extend security and privacy models to third-party data providers
	Objective 4.4: Provide secure and trusted worldwide data interchange
Goal 5: Build an effective cadre of highly skilled IT professionals	Objective 5.1: Promote an agile and diverse workforce
	Objective 5.2: Enhance the skillset of the IT workforce

APHIS Lines of Business

As a regulatory agency for USDA, APHIS has several primary lines of business (LoBs) that span across disciplinary, organizational, and international boundaries. Agency offices are dispersed nationally with personnel located in every US state and numerous countries.

The FEAF-II Business Reference Model (BRM) provides a functional viewpoint, rather than an organizational one, to describe an agency and describes it through a taxonomy of common mission and support service areas.



Figure 3. APHIS lines of business

Strategic IT Direction

In its *25-Point Implementation Plan to Reform Federal Information Technology Management (25-Point Plan)*, OMB directed federal agencies to adopt a “Cloud First” policy, in which agencies aim to utilize cloud services to satisfy its IT needs. The *25-Point Plan* also requires agencies to adopt a policy to make use of existing IT services rather than acquire one-of-a-kind solutions. Together, these policies are commonly referred to as “Shared First” and are the basis for future solutions architecture frameworks.

In December 2014, Congress passed the Federal Information Technology Acquisition Reform Act (FITARA) which require USDA and APHIS to evaluate how IT is managed and achieve tangible improvements.

APHIS will continue its support of FITARA through, among other actions:

- Improving management of its IT portfolio
- Leveraging shared services to provide capabilities required by its operational units
- Migrating IT systems to commercial cloud providers with FedRAMP certification

IT Trends and Influences

In updating APHIS’ Technology Roadmap, it is important to begin with a 20,000 foot view of major shifts in business trends, technologies, and other discontinuities that may impact how APHIS adopts and applies technology to its mission needs. The illustration below provides a big picture view of broad technology and business trends that are expected to affect Commercial and Public Sector organizations over the next decade.

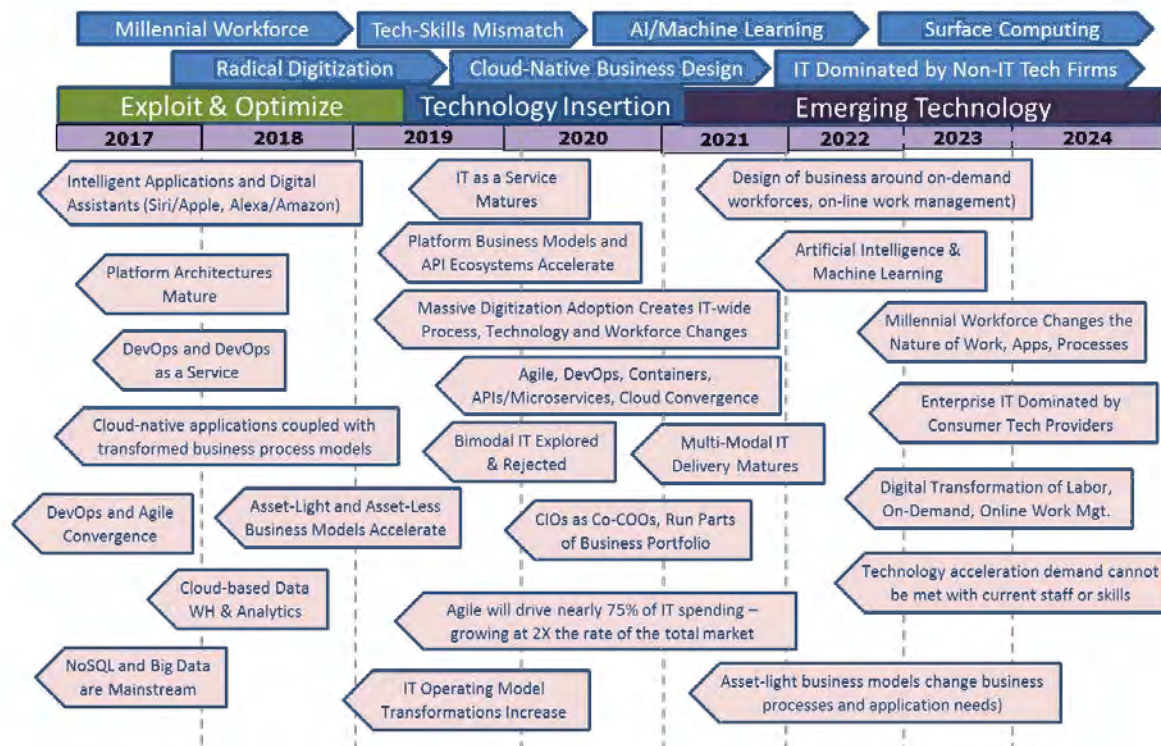


Figure 4. IT trends with potential impact on APHIS

These technology and business ideas are summarized by the broad time horizons in the sections below.

2018 (Exploit and Optimize Time Horizon)

For APHIS, the next 18 months will usher in major changes to its technology architecture, IT organization and overall IT capabilities. The following developments are relevant as APHIS seeks to optimize its current technology investments, while looking ahead to its future state:

- **Intelligent Applications and Digital Assistants, Voice Recognition Technologies:** Technologies are increasing embedding intelligence into devices, applications, and using voice technologies to enable them. Amazon Alexa, Apple Siri and other emerging voice technology platforms are driving rapid innovation. Applications will become more “intelligent” in exploiting these tools and technologies to transform the end-user experience from a GUI to a universal “Any UI” approach – voice, surface, touch screen, mouse.
- **Platform Architectures Mature:** Platform architectures, in support of platform business models and product development innovations, are being adopted more and more. Platform architectures typically involve building an application development platform, enabled by APIs, and are used to create a developer ecosystem to help monetize the APIs or even data assets of an organization. Platform-based product and application development.
- **DevOps and DevOps as a Service Goes Mainstream:** DevOps, and more recently, DevOps as a Service are increasingly the primary model for application development and capability delivery. More and more, DevOps capabilities are being offered as “as a service” from Amazon and others in support of container-based architectures, microservices and API-led development. The DevOps surge will push more Agile development to the forefront.
- **Cloud-Native applications coupled with transformed business process models:** Increasingly, Cloud-native application development will be the rule as organizations exploit the rich Cloud services available from Amazon, Microsoft and other major providers. These Cloud-native applications will drive changes in business process design and implementation to harness the transformative nature of Cloud computing, much as Netflix has done.
- **DevOps and Agile converge enabled by Next Gen Agile Lifecycle Management (ALM) tooling:** DevOps and Agile will converge over the next two years, with ALM tools increasing embedding DevOps, Container management and infrastructure provisioning into their capabilities.
- **Asset-Light and Asset-Less Business Models and Gig Economy continue to emerge:** Airbnb, Uber, Lyft and the Gig Economy illustrate the viability of driving a business model with limited to no physical assets. The Gig Economy provides resources to feed into the Asset-Light business model approach as well. Watch this space to see how far this trend goes, and how long it remains viable.

- **Cloud-based Analytics and Data Warehousing matures to mainstream adoption; “legacy” on premise Data Warehousing tools begin to fade.** Cloud-based analytics capabilities are improving while the prices drop dramatically, which will reshape the market for on premise analytics tools, which have a tarnished history for cost overruns and complex integration and maintenance needs. Cloud-based analytics and storage services will reshape data governance, data management, and more importantly, the provisioning of analytics services and analysis products to business end-users.

2019 – 2020 (Technology Insertion Time Horizon)

The Technology Insertion Time horizon is APHIS’ opportunity to explore cutting edge technologies that, by and large, are in the early-mainstream adoption phase in Commercial enterprises and in more technology sophisticated Public Sector organizations, e.g. Intelligence Community agencies. These are technology and business trends that, in some instances, may leapfrog APHIS ahead in its Mission, Business and IT objectives.

- **IT as a Service Matures:** Driven by Cloud computing, Cloud Service Brokers and platforms such as ServiceNow, the IT as a Service market will rapidly mature. Enabling IT as a Service with self-service provisioning and develop-enablement drives significant productivity, while ensuring direct business accountability for IT resources consumed.
- **Platform Business Models and API Ecosystems Accelerate:** Platform business models thrive as the intersection of online communities, API ecosystems, and social technologies enable new revenue models. API ecosystems provide monetization opportunities for data, for APIs, and drive demand for the technology enablement of digital platforms, API/microservices, and the associated technology advances.
- **Massive Digitization Adoption Creates IT-Wide process, technology and workforce changes.** Digitization will drive ongoing changes in IT operating models, organizational design, and the supporting technologies and workforce. Increased velocity and time to market will drive major changes in how IT delivers business capabilities.
- **Agile, DevOps, Containers, APIs/Microservices, and Cloud Computing Convergence reshapes the IT landscape.** The new IT technology landscape is being defined by the massive convergence of a wave of related technologies and delivery models. Agile and DevOps enable smaller teams to deliver business capabilities build on APIs and microservices. Containers and Cloud computing make deployment easier and faster, with automation of infrastructure supporting the entire end-to-end delivery model. These changes are forcing IT organizations to adapt to the new normal of business velocity.
- **Bimodal IT is Explored and Rejected in favor of Multi-Model IT Delivery.** Bimodal IT is being pushed by Gartner as an IT organization model to best support the business. However, Bimodal IT is failing, as splitting IT into two organizations is essential giving up on “fixing IT.” Bimodal IT will be replaced by multi-modal delivery using primarily Agile-DevOps delivery processes, and a substantial reduction of Waterfall over time.
- **CIOs continue to Assume COO-like duties, CTOs to Drive Cybersecurity.** A trend that began some time ago continues, as Chief Information Officers (CIOs) continue to

assume operational responsibilities for parts of the business portfolio. CIOs and CTOs will branch into two areas – as Chief Innovation Officers or Chief Security Officers. The demand for innovation and cybersecurity expertise will drive changes in overall responsibilities for CIOs and CTOs.

- **Agile will drive nearly 75% of IT spending, growing at 2X the rate of the total market.** Agile development is on the rise, which corresponds to the uptick in DevOps, Containers, APIs and Cloud computing. All of these technologies are driving high velocity IT delivery models in support of increased Digitization efforts.
- **IT operating model transformations continue with Digitization acceleration and massive Cloud-business model transformation.** As the forces of change in technology continue, IT operating models must adapt. IT processes, organizations and supporting technologies will all be oriented toward Agile-DevOps-Cloud. Waterfall delivery approaches and PMOs will gradually diminish as Lean IT, Agile and Kanban increase in adoption.

2021 - 2024 (Emerging Technology Time Horizon)

The Emerging Technology horizon is a forward-looking view of technologies that may impact APHIS' Mission and IT strategies over the next few years. These are technology and business trends that, in some instances, may leapfrog APHIS ahead in its Mission, Business and IT objectives as they are proven and adopted in sophisticated Commercial enterprises and advanced Public Sector agencies. Many of these are not proven in their business or IT applicability yet, but are technologies to monitor and evaluate in a Technology Portfolio management approach.

- **Design of Business around On-Demand Workforces and Online Work Management:** The workforce of the future is changing with the influx of Millennials into the workforce, and new patterns of engagement with that potential workforce, e.g. Gig Economy dynamics. Corresponding with these demographic shifts are innovations in the tools to manage this changing workforce – on demand access to labor and online work management tools. These tools, coupled with the changing attitudes and work habits of the millennial workforce, will force businesses to change their processes and policies to work around these evolving patterns of workforce engagement.
- **Artificial Intelligence (AI) and Machine Learning Impact IT Operations, Cybersecurity and other Business and Personal Activities.** AI and Machine learning are already driving innovations in our day to day activities, with smart and self-driving cars, smart drones, voice-activated technologies, smart homes, and more. AI and machine learning will continue to infiltrate our business and personal lives, bringing efficiencies and automation to manual tasks, and improving the ways in which work and play are performed.
- **Millennial Workforce Changes the Nature of Work, Applications, and Business Processes.** Millennials are the generation of individuals between the ages of 15 and 35 years old. They are the first generation of Digital Natives, and they are increasingly responsible for new IT innovations, new technology consumption patterns, and the rapid adoption of mobile technologies, social media, and the demand for these technologies in Commercial and Public Sector enterprises. When we think of the Millennials, we must understand that they are our employees and future work force, and they are our current

and future customers. When we are selling goods and services to Millennials, we are increasingly selling to an individual as well as the direct and indirect members of their social networks. Millennials will almost always solicit opinions and referrals from their online network of real and virtual friends. Millennials think differently about technology, work differently and behave differently. We must learn to treat Millennials as prospective customers, prospective employees, and prospective business partners, while embracing the attitudes, energy, collaborative thinking and creativity they are bringing to the table.

- **Enterprise IT Dominated by Consumer Technology Providers, e.g. Amazon, Apple, Facebook, Google; Legacy IT Providers Begin to Consolidate and Fade.** Increasingly, Enterprise Technology will be provided by consumer technology companies, such as Amazon, Google, Apple and others. A challenge that arises with the rise of these new titans of technology is the assurance that corporate enterprises can acquire and implement Enterprise-class capabilities from Facebook, Apple, Google and Amazon and other emerging technology firms. Granted, Amazon and Google, being Cloud computing pioneers, certainly know how to deliver enterprise-class Cloud services, and have been doing so for years. However, obtaining enterprise-class solutions and services from Face book, Apple and the host of related technology firms poses a challenge. IT organizations must quickly find ways to evaluate and insert these new technologies into the enterprise IT baselines, while providing governance, security and trust that these technologies will not expose the enterprise to additional risk. On the other hand, IT must have processes to evaluate the relative risk to the benefits offered by these new technologies as well.
- **Digital Transformation of Labor Accelerates with Millennials, On-Demand Workforces and Online Work Management.** Digital transformation of labor will be enabled by and demanded by millennials. Today's Millennials work, think, collaborate, and view technology differently than previous generations of technology users. They can be characterized as Remote, Distributed Anonymous Collaborators, or RDACs. RDACs represent the demographic transition to the Millennials, digital natives who have no qualms about working with someone they have not met in person, and love to work via collaborative, social-enabled mechanisms and processes. RDACs will accelerate the trend toward working remotely from home offices, and collaborating via Skype, social media and mobile technologies. The question is, will corporate work patterns evolve to exploit the technology attitudes and emerging skill sets of Millennial RDACs?
- **Technology Acceleration Rapidly outpaces Enterprise Skills, Creating a Massive IT Workforce Gap.** The pace of technology is accelerating and outstripping the training and recruitment cycles within large enterprises. The result is an astonishing skills gap that will require an increase in external consulting budgets to bridge the gap. Even engaging outside expertise will not be sufficient, and the convergence of technologies (containers, APIs, micro-services, Cloud) and delivery process (Agile, Scaled Agile, DevOps) will fuel this skills gap.
- **Asset-Light Business Models force changes to business processes and application needs; Cloud-native applications are necessary, not optional.** The uptick in asset-light and asset-less business models exemplified by Airbnb, Uber and others illustrates

the relevance and importance of business model and business process design using Cloud-native approaches. Cloud-native processes and applications can be quickly provisioned and scaled, horizontally and vertically, as well as geographically, to address demand growth. These new business models may last, or they may fade, but they have illustrated the value of Cloud-native business processes and applications as the way to quickly identify a market need, fulfill it with a new solution, and scale it rapidly. Now, mature enterprises must adopt these innovative concepts internally.

APHIS To-Do List for Big Picture Trends

Based on this survey of Big Picture business and technology trends, what should APHIS do? The following recommendations should be considered to plan for and anticipate how these Big Picture trends may impact the APHIS enterprise:

- Continually evaluate emerging technology and business trends in an ongoing portfolio-based or technology radar approach
 - Add new ideas and trends during the course of the year, and then incorporate them into the Technology Roadmap as appropriate
- Develop an annual IT Roadmap update process that corresponds to or is triggered by the IT Annual Strategic Planning process
- Ensure that the IT Roadmap incorporates non-Technology drivers and trends into the technology planning process; business and process trends can spur technology trends in response.
- While People, Process and Technology provides a broad 3-faceted lens by which to evaluate technology trends, subdividing these will help with a more robust framework for the incorporation of technology trends.

APHIS can leapfrog ahead in its capabilities without incurring unnecessary risk by using the IT Roadmap and applying technologies to its core Mission and IT processes and capabilities.

Through 2020

Impacts and influences is broken into three time horizons. Tactical actions time horizon, from now to 18 months out, focuses on APHIS exploiting and optimizing technologies that are currently in house, on the shelf, and already paid for.

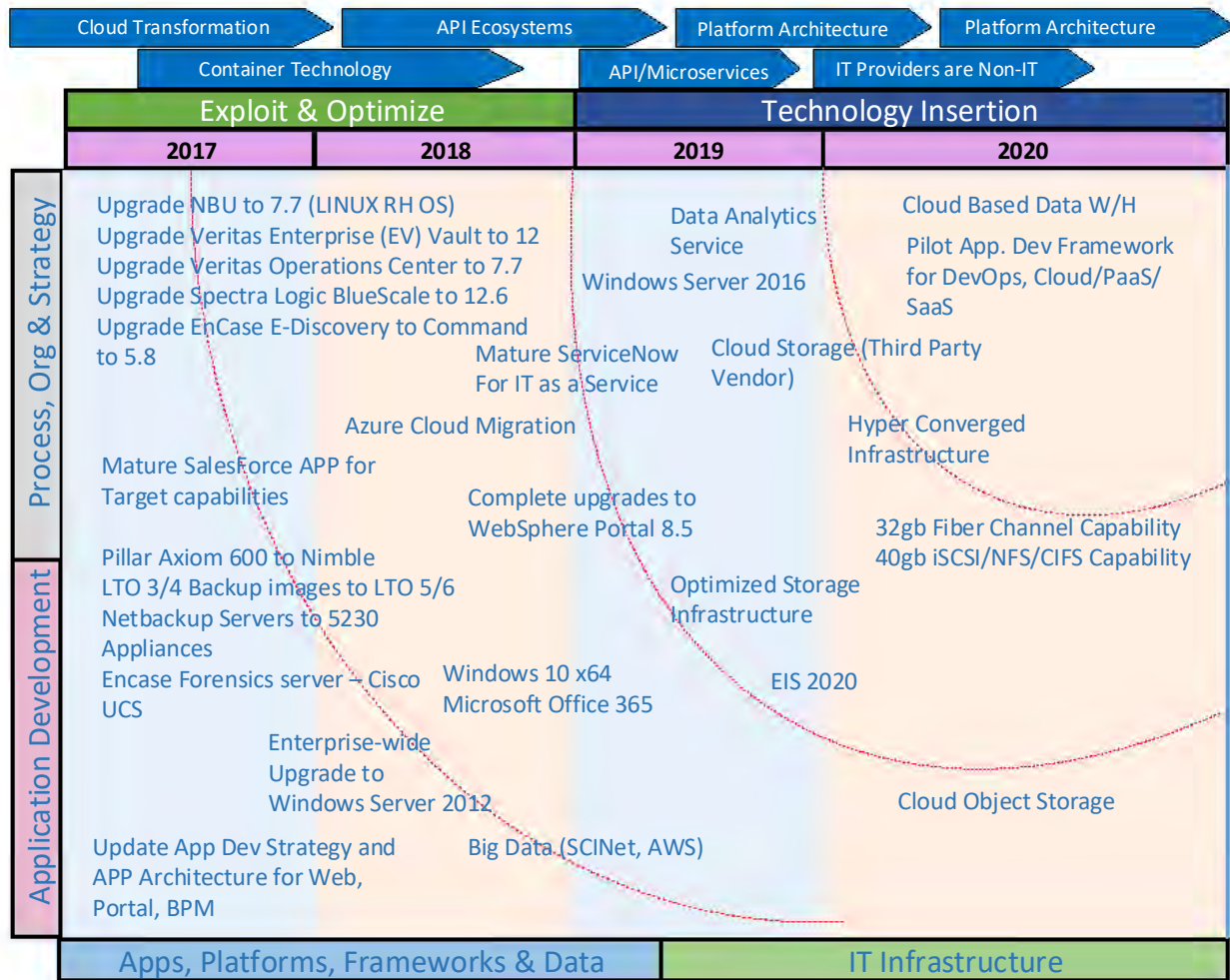


Figure 5. APHIS action items through 2020

Tactical Actions - 2017 - 2018

Possible Actions: Deploy, Optimize, Monitor, Evaluate, Adopt, Avoid

APHIS’ tactical actions to target for the next 18 months. During this time horizon, the Exploit and Optimize time horizon, APHIS should be focusing on one primary goal: exploit, deploy and optimize the current technologies that APHIS has “on the shelf.”

The following list of technologies comes from APHIS’ existing planning documents.

IT Infrastructure – Storage (Upgrade, Migrate and Optimize Storage Infrastructure)

- Upgrade NetBackup (NBU) to 7.7 (LINUX RH OS)
- Upgrade Veritas Enterprise (EV) Vault to v12
- Upgrade Veritas Operations Center to v7.7
- Upgrade Spectra Logic BlueScale to v12.6
- Upgrade EnCase Forensic to 7.12

- Upgrade Encase E-Discovery Command to 5.8
- Migrate Pillar Axiom 600 to Nimble
- Migrate LTO 3/4 Backup Images to LTO 5/6
- Migrate Netbackup Servers to 5230 Appliances
- Encase Forensics server – Cisco UCS
- Enterprise-wide Upgrade to Windows Server 2012
- Windows 10 x64

Application Infrastructure and Applications

- Mature Salesforce App Dev for target capabilities
- Azure Cloud Migration
- Update App Dev Strategy and App Architecture for Web, Portal, BPM
- Complete upgrades to WebSphere Portal v8.5
- Deploy Office 365 APHIS-wide

IT Service Management (ITSM) Capabilities

- Mature ServiceNow capabilities to position for IT as a Service and potential Cloud broking portal

Data, Analytics and Data Architecture

- Big Data (SCINet and AWS)

Summary

Tactical actions is focused on deploying and optimizing currently-owned technology capabilities. Some of these items may be replaced by newer capabilities in the Cloud, and those choices should be made while performing due diligence and risk mitigation.

Technology Insertion - 2019 - 2020

Possible Actions: Deploy, Optimize, Monitor, Evaluate, Adopt, Avoid

Technology Insertion (TI) is focused on newer technologies that have entered early mainstream adoption in Commercial vertical industries, and in some Public Sector organizations with a more aggressive technology adoption posture. These technologies have been vetted and proven, but are very immature within APHIS.

IT Infrastructure

- Hyperconverged Infrastructure
- 32 Gb Fiber Channel Capability
- 40 Gb iSCSI/NFS/CIFS Capability

- EIS2020 Strategy and Contract
- Windows Server 2016

Application Infrastructure and Applications

- Pilot App Dev Frameworks for Agile, DevOps, Containers/PaaS

Data Analytics, Data Architecture, Storage

- Data Analytics and Data Warehousing (As a Service)
- Explore Cloud Storage for various use cases, e.g. Object, Block and File-based storage, as well as target use cases for Disaster Recovery (DR) and Business Continuity, and others.

Summary

Technology Insertion is focused on exploring and deploying technology capabilities that for the most part are mainstream in Commercial enterprises, but still very new to APHIS. These areas will be very innovative and transformative for APHIS, internally, but in reality will bring APHIS “up to date” with respect to the commercial business world.

2020 Action Plan: Things to Do Tomorrow

The following actions should be taken by APHIS over the next 6 months to 3 years:

- Aggressively evaluate the “on the shelf” technology portfolio for alignment and relevance to the APHIS IT strategy
 - If an “owned” technology fits the future state, deploy it; if it does not, remove it
- Work aggressively to bring APHIS up to date with respect to more technology aggressive Public Sector organizations, while mitigating risk and managing costs
- From a portfolio and risk management perspective, APHIS must invest appropriately across all dimensions of its IT portfolio to achieve the Cloud First posture, achieving efficiencies where possible, yet leapfrogging ahead in areas such as Cloud-native and PaaS application development, IT as a Service and other areas.

Emerging Technology - 2021 – 2024

Emerging Technology is focused on very emergent technology trends that may impact APHIS, and may eventually be deployed. These are very new capabilities that are not widely adopted in any industry, but may be under evaluation via proof of concepts (POC) or in the research and development (R&D) process within certain organizations. The Emerging Technology time horizon is focused on the 2021 – 2024 time frame, and is illustrated below:

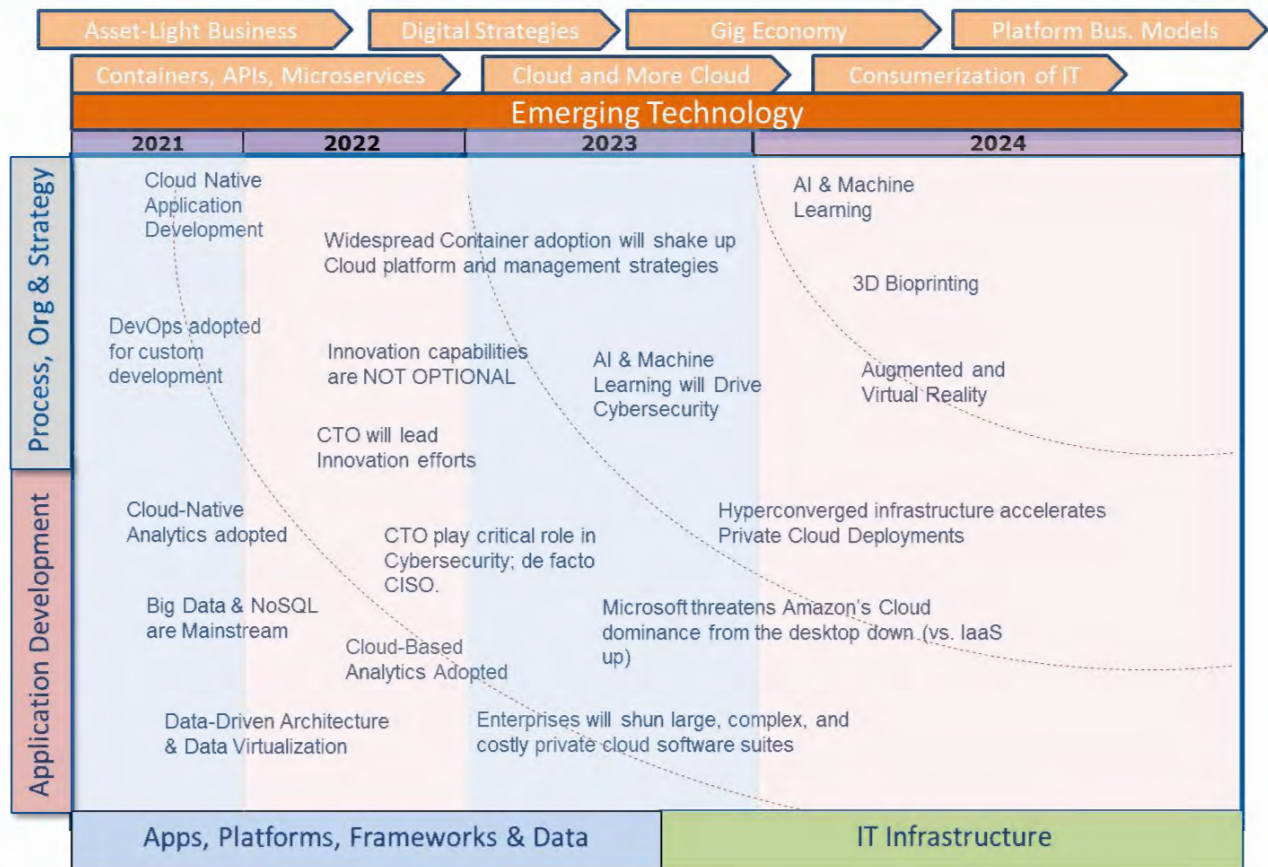


Figure 6. Emerging technologies of potential interest

The areas of emerging technology are summarized below:

New Technologies and Concepts

- 3D bioprinting finds applicability for scientific research and related needs
- Artificial Intelligence (AI) and machine learning become woven into many areas of IT and Cybersecurity capabilities
- Augmented and Virtual Reality find pragmatic use in IT needs and end-user requirements

IT Infrastructure

- Enterprises avoid large and costly private Cloud software suites
- Microsoft threatens Amazon's Cloud dominance from the Desktop down to IaaS
- Hyperconverged infrastructure may accelerate private Cloud deployments, leading to more hybrid Cloud deployments

Application Infrastructure and Applications

- Cloud-native Application Development (beyond PaaS) accelerates
- Widespread Container adoption will shake up Cloud platform and management strategies

- Cloud-based analytics and Data Warehousing are mainstream for key APHIS requirements
- Big Data and NoSQL are adopted widely and mainstreamed within APHIS

IT Strategy, Processes and Organization

- CTO plays a critical role in Cybersecurity, as pressure mounts and security technology accelerates; CISO role will become far more technical, hence the CTO must step up
- CTOs will become more involved in internal innovation efforts in partnership with the Business/Mission

Summary

Emerging Technology examines potential emerging technologies that may impact APHIS in the next five to seven years. The main actions APHIS should take is to monitor these technology trends. As with all technology planning processes, some of these will be replaced by new innovations, and the pace of some of these may accelerate forward, forcing their way onto the APHIS planning horizon sooner than it may anticipate.

IT Portfolio and Project Governance

The USDA Office of the Chief Information Officer (OCIO) issued its Integrated IT Governance Framework² (IITGF) handbook to clarify roles of its IT governance bodies and those of the agencies.

According to the USDA IITGF,

“Each new proposed IT investment will proceed through IITGF Decision Gate 1, associated with the Initiation Phase, and will be determined by the governance board to be either a Major Investment or Non-Major Investment. If determined to be a non-major investment, the project manager will be notified that governance delegation will be returned to the issuing agency and can proceed under the agency governance process. If the proposed investment is determined to be a Major IT investment, it will proceed along the governance path as presented in the IITGF Handbook.”

Performance Metrics:

Enhance management and oversight of IT investment portfolio	APHIS Goal
Continue annual portfolio reviews	Hold reviews in 3 rd Qtr
Draft System Development Life Cycle Guide	December 2018
Finalize System Development Life Cycle Guide	2 nd Qtr FY 2018
Issue agency directive signed by Administrator	Effective 4 th Qtr FY 2018

Strategy

Implementation of new technologies is an ever-evolving process to identify which ones the agency will leverage and the process to realize those advancements in IT projects designed to deliver new or modernized capabilities to the business community. To ensure that APHIS’s programs adopt technologies that the agency’s IT leadership supports, the APHIS CIO has authorized a TRB to oversee IT modernization efforts throughout the agency.

In addition to the IT Roadmap, the APHIS System Development Life Cycle Framework (SDLC) identifies required artifacts at each project phase and supports the TRB to ensure the agency’s target architecture is applied to IT system development projects. The SDLC also describes USDA and APHIS IT governance processes and management groups. This includes the process that project sponsors and managers need to follow to obtain approval for proposed IT

² Version 3.2 was issued by the USDA OCIO on April 1, 2014

investments, systems, and applications and to obtain approval to proceed to the next lifecycle phase.

The SDLC is applicable to all IT projects, although project sponsors and managers are encouraged to work with the TRB to tailor project reviews and the list of required artifacts to align with the acquisition methodology employed for their projects. This could include adoption and integration of one or more shared services; application of the waterfall, agile, or other methodologies to develop custom software; or a combination of shared services and custom development.

Shared Services

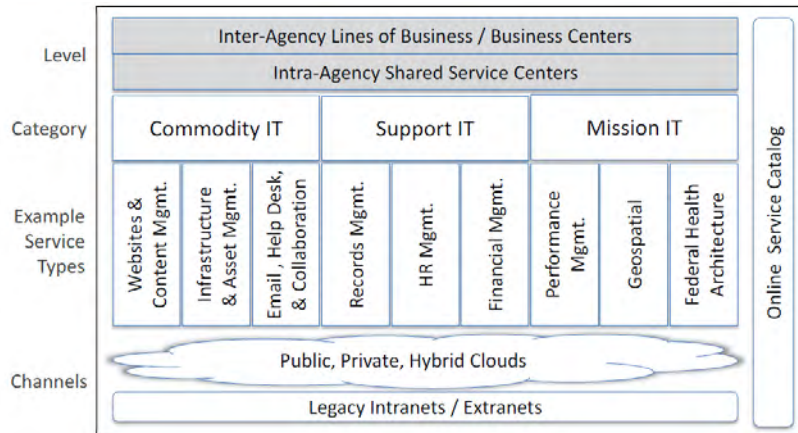


Figure 7: OMB’s concept for IT shared services

OMB issued *Federal Information Technology Shared Services Strategy (Shared First)* in 2012 to provide policy guidance and implementation strategy to agencies. As depicted in Figure 5 it defines categories of IT and the types of services commonly associated with each.

Shared services refers to adoption of existing software solutions; utilization of existing contracts to achieve savings on

IT hardware, software, and services; cloud computing services including Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS); and other methods to achieve functional and technical capabilities more quickly and at lower cost.

Shared First has been shown to reduce the complexities, time, and costs associated with planning, procuring, deploying, and maintaining IT services by leveraging existing, common hardware and network platforms and software applications.

Early successes for USDA and APHIS were the consolidation of e-mail services, deployment of a shared credentialing service (eAuthentication), consolidation of phone and mobile device contracts, migration to ServiceNow for help desk support, among many others.

Going forward, APHIS will continue to identify and leverage shared services whenever it’s in the best interests of the agency and will utilize them to the greatest extent possible to avoid duplicating functionality that’s available from other federal agencies.

APHIS evaluates existing contract vehicles such as blank purchase agreements that are available to it.

APHIS established a GIS work group and program offices are leveraging a USDA blanket purchase agreement to migrate GIS applications to the AWS-hosted Esri cloud and adopt Esri GIS tools. The project will result in improved access to GIS data collection and reporting tools by APHIS employees in the field as well as provide advanced GIS analytical tools to analysts and decision-makers in regional offices and headquarters.

Performance Metrics

Utilize shared solutions	APHIS Goal
Require alternatives analyses to include potential options for leveraging shared solutions	Initiate 2 nd Qtr 2018

Replace legacy PATS application with Forest Service shared solution, eTracker, and retire the APHIS Domino platform	FY 2018
Cooperate with ARS on SEI-Net for big data initiative	FY 2018
Evaluate offerings within USDA	Ongoing

Strategy

ITD maintains open communications with USDA OCIO and other agencies to identify available services that could be of use to the program offices. For example, in the 1st Qtr FY 2018, the Forest Service (FS) demonstrated its data warehouse solution which is hosted at NITC.

As part of the process to obtain approval and funding for new systems, APHIS will require that alternatives analyses include an assessment of potential shared sources.

ITD continues to represent APHIS on key USDA work groups and councils related to IT including the EA Council and the Category Management Interest Group which provide the agency with knowledge of shared solutions available through OCIO and other agencies.

Shared services are utilized to the greatest extent possible to avoid duplicating functionality that's available from other federal agencies.

Example of shared services currently being utilized or provided include:

Service	Provider	Description
eAuthentication	USDA	APHIS eAuthenticate user credentials Control access to IT systems
National Select Agent Registry	Center for Disease Control and Prevention	Used to check status of imported agents
eSignLive	APHIS	Electronic and digital signatures
pay.gov	US Treasury	Payment of user fees Payment of penalties

Cloud Computing

APHIS Cloud Computing Vision and Mission

APHIS will support business needs with a portfolio of cloud computing services that enhance business innovation and productivity, enable partner collaboration across APHIS's value chain, improve product development and delivery, and support overall growth and performance. APHIS will emerge from data center consolidation efforts as an organization using cloud based services. We expect, within three years to be a model for organizations using and managing cloud based services to meet business needs and requirements. ***APHIS will deliver on the principle of Cloud First in all aspects of business and IT performance, delivering best in class IT services and solutions in a rapid, compliant, secure, and robust manner on par with industry-leading cloud service providers.***

To satisfy the DCOI mandate and enhance the APHIS application computing, development, and data management capabilities, APHIS will use and exploit cloud based services with a cloud first model that will better serve the organizational mission.

Cloud computing in concept and reality can provide the Agency with ways to improve upon data management, application development, controlling costs, managing infrastructure and solution delivery. Cloud computing provides numerous mechanisms that enable better response to both establishing and maintaining business needs, requirements and compliance initiatives.

The overarching results being strived for include the following:

- Uniformly change APHIS IT infrastructure into a service
- Leverage cloud architectures and services to consolidate IT infrastructure where possible
- Strengthen and add capability and capacity to support and delivery services
- Establish and address application development needs and delivery
- Enhance cybersecurity efficacy and efficiency

These cloud computing theme areas have informed and guided the APHIS Cloud strategy.

APHIS Cloud Computing Context and Current Situation

APHIS formally began using commercial cloud services when the Agency's Domino e-mail service was transitioned to a Microsoft Office Business Productivity Online Suite (BPOS) Exchange service in 2011. APHIS continues to identify and leverage other cloud technologies for business applications. These include the use of Salesforce, primarily in support of the Certification, Accreditation, Registration, Permit and other Licensing (CARPOL) project, and ServiceNow that has replaced the Remedy service desk application platform and infrastructure. APHIS is continuing to expand cloud services for important or priority based requirements. ESRI GIS, eSignLive and Azure services are currently being established.

The APHIS Enterprise Cloud Working Group was formed in January of 2016 to address development of cloud strategy and provide a means for program unit input and influence. Part of their work along with information from discovery sessions held by AgilePath Corporation helped form and influence elements of this strategy. These sessions allowed for assessments of the current situation to be made which including a cloud maturity assessment. Included in the discovery sessions were multiple program units and key IT leaders, groups and staff. Here are some of the highlights from those sessions:

- Cloud services and environment adoption is ongoing.
- Current cloud maturity and existing capabilities are robust in some areas, and somewhat immature in others.
- Some cloud services, specifically SaaS applications have been adopted to date and are in a maturing phase of use.
- Other areas of APHIS are not yet moving to Cloud environments, specifically, those areas that have legacy applications that will not easily move.
- Many program units have their own IT resources/skilled staff.
- No one single program unit has what we could consider a Cloud Services Organization. The Digital Services Support Office is about the closest APHIS has, but are narrowly focused.
- APHIS is doing well at Portfolio Management using FAC/PPMs.
- There is currently a potential for data loss due to existing systems and processes

APHIS's business goals and objectives for cloud computing represent a number of strategic themes that cut across both business and IT requirements. The following themes have been identified through analysis of APHIS's cloud computing goals:

- Adopt an enterprise approach to cloud computing
- Establish cloud computing operational models and services
- Comply with the Data Center consolidation efforts
- Migrate or redevelop cloud-ready applications or platforms to cloud-based services
- Increase the efficiency and capability of current and future IT program investments
- Increase the value of IT dollars spent
- Standardize enterprise computing

Performance Metrics:

Cloud	Services	Services	Goals
Azure	IaaS PaaS SaaS	Microsoft Outlook, SharePoint, Dynamics CRM, eSignLive, general application hosting	Pilot APHIS: 3 rd Qtr 2018 Production: 4 th Qtr 2018 Initiate migration of applications to the cloud – within 6 months of production
Salesforce	PaaS SaaS	Common set of tools and apps that facilitate development of applications to be hosted on the Force.com cloud environment	Support Salesforce governance group – ongoing
ServiceNow	SaaS	Helpdesk software and supports change management and technical review board activities	Add TRB module 2 nd Qtr FY 2018
Esri	SaaS	Geospatial tools hosted on AWS	Migrate Esri applications to Esri - ongoing
SciNet	SaaS	Big Data	Sponsor FedRAMP approval for Moderate level in FY 2018
Palantir	SaaS	Data Warehouse capabilities	Implement in FY 2018

vBrick	SaaS	Video conferencing system that supports on-demand delivery of recorded materials	Sponsor FedRAMP assessment - underway Migrate to cloud solution within 6 months of FedRAMP certification
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Strategy

APHIS is participating in a USDA-led project to pilot Microsoft Azure cloud services. In addition, APHIS is sponsoring the FedRAMP authorization of the enterprise content management tool SpringCM, which can be integrated with Salesforce.

Program offices throughout APHIS are participating in a project to migrate GIS applications to the Esri cloud and adopt Esri GIS tools. The project will result in improved access to GIS data collection and reporting tools by APHIS employees in the field as well as provide advanced GIS analytical tools to analysts and decision-makers in regional offices and headquarters.

In addition, APHIS is collaborating with ARS on a big data initiative by sponsoring FedRAMP approval at the Moderate level and utilizing Sei-Net, which is a hybrid cloud solution. It's designed to utilize servers hosted at the Ames, Iowa facility with additional storage available on AWS, which will provide extensive suite of analytical tools.

APHIS will continue to identify and leverage cloud computing and shared services whenever it's in the best interests of the agency.

In September 2016, APHIS released its cloud strategy.

The overall direction of computing in USDA and APHIS is “**Cloud First**” which was handed down from the Federal Government to all departments. The idea is to utilize the efficiencies of Cloud Services available on the commercial market to achieve the IT/computing goals of its agencies across the board.

The APHIS Cloud First approach involves many dimensions. Requirements and considerations, as bulleted below:

- Driving Forces
- Operational Support
- Security
- Multiple Cloud Services and Context

Each of these are explained in the details below.

Driving Forces

The strategic nature of cloud or what is the landscape, maturation and acceptance of the current technology market has permuted into most of the Federal Government's thinking and established set of directions. The adoption and acceptance has escalated in the last two years to where it is now thought of as a first consideration. APHIS sees the direction of the market and that innovations are happening in cloud-based services. The key drivers associated with this strategy of cloud include the following:

- Data Center Optimization Initiative (DCOI)
- Federal Cloud Computing Strategy - Cloud First
- Legacy Active Directory Shutdown and Removal of EAD Forrest Trust
- Federal Information Technology Acquisition Reform Act (FITARA)
- Agency Information Technology Services Modernization

Operational Support

Moving from a traditional on premise support model to cloud based services introduces fundamental shifts in delivery of IT services to our stakeholders. The nature of some costs will change from being capital expenditures (CAPEX) or investments in hardware and infrastructure to an operational expense (OPEX) or generally termed with the cloud as a pay-as-you go model. This will shift the focus from asset ownership to service management. The cloud will enable APHIS to focus more on service delivery.

As adaptation of "Cloud First" matures within APHIS and the shift from CAPEX to OPEX occurs, the governance framework for administrative and operational support will be changed. APHIS will shift roles and responsibilities of IT and support staff according to the different cloud implementations or requirements. ITD will work with the programs units to ensure this is completed and agreed to by all parties. The establishment of an APHIS Cloud Services Organization (CSO) will be critical to ensure the success of the Cloud First strategy for APHIS.

Note: The CSO does not have to be a net new organization. It could be established by refocusing existing resources under this construct.

Security

While applications are migrated to the cloud-based environments, security will be the utmost importance to ensure all data, information systems and assets are properly secured with approved security frameworks and Agency standards. Several governing bodies' help agencies navigate this landscape and provide guidance which APHIS will follow.

The Federal Information Security Management Act (FISMA) and the Federal Risk and Authorization Management Program (FedRAMP), are core security frameworks that each agency must comply with when addressing security policy compliance and requirements. The main difference between FISMA and FedRAMP is that FISMA is applicable to all agencies and their systems while FedRAMP only applies to agencies using or transitioning to the cloud based

environments. FISMA and FedRAMP are interrelated in that Cloud Service Providers (CSP) chosen by APHIS must have the same level of FISMA compliance as if APHIS were hosting an application or system. Although they are different, FISMA and FedRAMP each have standards which agencies need to meet. FISMA is an integral part of the current security compliance processes at APHIS. FedRAMP is newer to the Agency and is being further adopted with increased use of cloud services.

The Agency looks to use and exploit available cloud based services, functionality and toolsets to further increase its cybersecurity efforts and control of resources where available and when necessary.

Some examples of Cloud Security services are authentication, single sign-on, authorization, credential mapping, device profiling, encryption, tokenization, logging, alerting, malware detection/prevention and so on.

Cloud Data Management is closely coupled with Cloud Architecture Security Broker (CASB) implementations as well. Often times a cloud architecture has public cloud combined data storage that is accessed by different applications. The interfaces to these containers must be well guarded by CASB services.

Cloud First Security via Cloud Architecture Security Broker (CASB)

The APHIS cloud will be secure, with its state of the art Cloud Architecture Security Broker (CASB) implementation securing information at the packet level, while ensuring world class Authentication and Authorization (Auth/Auth) security for all users. APHIS end-users will access its rich services catalog knowing that they can access cloud services that are secured and trusted.

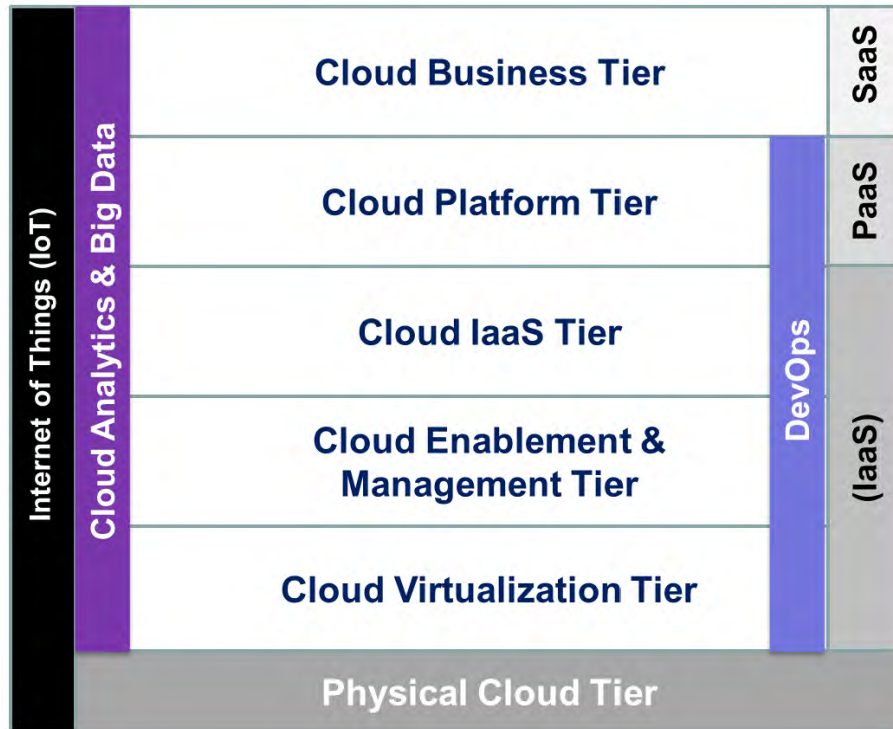
While many CASBs leverage log data from firewalls and web proxies to gain visibility into cloud usage, there are two major deployment architectures that CASB solutions used to enforce policies across cloud services: proxies and APIs. In proxy mode, a CASB sits between the end user and the cloud service to monitor traffic and enforce inline policies such as encryption and access control. CASBs can leverage a forward proxy, reverse proxy, or both. Another deployment mode is direct integration to specific cloud providers that have exposed events and policy controls via their API. Depending on the cloud provider's API, a CASB can view end user activity and define policies.

Multiple Cloud Services

APHIS's Cloud Computing Strategy will leverage a multi-cloud implementations. This model will unify cloud services from APHIS's private cloud with other shared or public cloud service providers into a single unified cloud services catalog.

The APHIS Cloud Computing Strategy defines the overall approach for deploying a multi-cloud environment in support of APHIS's key business drivers, while integrating legacy APHIS with the parent APHIS IT organization. The APHIS cloud will also be the point of migration for APHIS applications and workloads as it transitions to cloud services while addressing DCOI compliance.

The APHIS cloud will be a full cloud stack deployment, panning all cloud service layers, while also enabling Big Data and cloud-enabled analytics capabilities. All major cloud service tiers will be included in scope as illustrated below:



APHIS's cloud services scope reflects all cloud services in the generic cloud computing stack, including IaaS, PaaS, SaaS, cloud Analytics and Big Data.

In looking at the Cloud services to be offered under APHIS's Cloud First Strategy. Defining functionality and services, selecting appropriate providers, and accurately developing the architecture and designs will be key. The explanations and illustration below provides a visual context of how the concepts of cloud and the cloud services APHIS is currently focused on come together.

Self-Service Portal – An intranet based portal to help guide cloud clients through self-service creation of low level, Dev/Sandbox environments. The intention here is to enable rapid creation of cloud environments to get capability up and running quickly, helping APHIS's business units' time to market concerns.

APHIS Security and Privacy Controls - All access to cloud services would be governed through an APHIS-approved security layer.

Big Data and Analytics – This is typically found as additional capability added to cloud environments that. Big Data has somewhat of a low profile at the moment in APHIS, but will potentially increase in overall use moving forward. Analytics and Big Data will also see an increase in popularity over time.

Private Cloud Services – This represents any private capabilities that will not be moved to public cloud.

Commercial Cloud Providers and Offerings

This is current services being used or pursued like Office 365, Salesforce, ESRI GIS, ESignLive, ServiceNow, Azure and any identified future need services.

This illustration show the marriage between the concepts and the actual service providers, architecture for the services and functions. Integration elements are expected to be formulated with much more detail.

<i>Self-Service</i>							
<i>Cloud Brokering Platform/Process</i>							
<i>Security and Privacy Controls</i>							
Big Data and Analytics	Office 365	Salesforce	ESRI GIS	<u>eSignLive</u>	<u>ServiceNow</u>	SaaS	DevOps
	Azure Cloud Services	Force.com				PaaS	
	Azure				Private Cloud Services	IaaS	

APHIS's success with cloud computing depends on meeting specific key criteria submitted by various stakeholders, as well as industry-wide criteria. The following are offered as key criteria for cloud computing success:

- Establish Cloud Services Organization to Spearhead the Cloud First Strategy Execution
- Create Cloud Decision Matrix
- Perform Market/Vendor Analysis of Cloud Broker Platforms and Tools (Brokers, Application Monitoring Suites, Security providers, DR, Cloud Integration/Management tools, et al.)
- Perform Legacy Application Cloud Migration Analysis (Coarse-Grained and Fine-Grained De-comp as needed)
- Acquire and Implement Cloud First Platform and Tools
- Assess and Continue Cloud First Technical Pilot (Brokered Platform) with providers as necessary
- Evaluate Technical Pilots, Iterate Environment/Lessons Learned
- Onboard Key Cloud Providers and Services

- Prepare Foundation Use Cases (heretofore referred to as Wave 1)
- Stand up Cloud First Operations and Support Team(s) and Processes
- Complete Cloud First Business Pilot with Foundation Business Use Cases
- Review Cloud First Pilot, Incorporate Lessons Learned, Iterate Cloud First Operating Model
- Plan for Formal Launch of APHIS Cloud First Environment/Platform (Wave 1 Services)
- Launch: Roll Out Wave 1 Cloud Services Catalog and Foundation Use Cases
- Migrate Appropriate Subset of the Legacy Applications to the Common Cloud Environment
- Expand APHIS Common Cloud Environment to More Business Organizations (Horizontal Expansion)
- Launch Digital Transformation Initiative to Harness the Cloud for Innovation and Mobile
- Continue to Mature the Cloud First Platform/Common Cloud Environment
- Sustain and Evolve the Cloud First Environment

The following figure illustrates the marriage between concepts and actual service providers, architecture for the services and functions. Integration elements are expected to be formulated with much more in FY 2018.

SpringCM Content Management Cloud Service

APHIS sponsored the FedRAMP authorization of the enterprise content management tool SpringCM, which can be integrated with Salesforce.

Azure Cloud

APHIS is participating in a USDA-led project to pilot Microsoft Azure cloud services. APHIS has selected Azure as its preferred IaaS provider.

IT Infrastructure Optimization

With roughly 500 remote field locations around the world, APHIS is a very distributed organization working with stakeholders and cooperating with state and foreign governments at

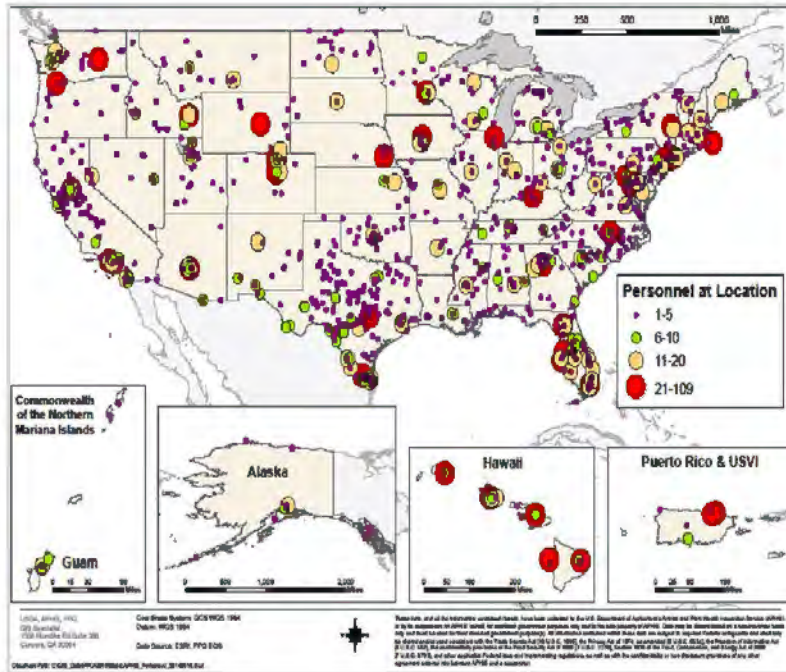


Figure 8: Distribution of APHIS employees within the US and its territories

all levels to achieve our goals and objectives. Many of the agency’s employees work in very remote areas with little or no telecommunications services available. At the same time, the IT hardware and software required of their positions are becoming more sophisticated.

The distribution of employees comes with many challenges for getting network connectivity into areas with little or no coverage for any of our traditional network technologies.

Software applications that APHIS employees rely on to

perform their mission-critical functions are growing in complexity; and employees are accessing them on a broader range of devices, placing a high demand on the agency’s network. Employees need high throughput with very rapid response times in all areas locations.

In order to meet end-user needs, ITD takes into account the dynamics of the agency’s workforce as it identifies promising technologies that can be utilized to increase network reliability and security, and reduce response times as well as monitor existing hardware and software for end-of-support.

Network Optimization

Currently, the USDA multi-tier network architecture isolates the APHIS enterprise infrastructure from the department’s. One benefit of being isolated from the USDA network is security. However, there are drawbacks such as increased management and possible restriction to resources across tiers.

Working with USDA OCIO, the current multi-tier network architecture will be reduce to one, which will open up resources across the expanded USDA network.

Performance Metric:

Reduce network tier structure	APHIS Goal
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Award contract	
Develop plan to implement changes to network architecture	

Challenge

The reduction in tiers will require the addition of 500 firewalls at all locations other than Ft. Collins, Colorado and Riverdale, Maryland, and the APHIS network security team will need to work closely with OCIO to maintain data integrity.

Strategy

In 2017, the General Services Administration (GSA) awarded a contract for Enterprise Infrastructure Solutions (EIS), known as EI2020. Through the contract, USDA selected voice and data service providers in September 2018, with migration scheduled for FY 2019. The goal is to reduce number of networks department-wide.

Data Center Optimization Initiative

The OMB Data Center Optimization Initiative³ (DCOI) requires agencies to retire 60% of their servers located in non-tiered data centers. The lifecycle plans for field servers are managed by the programs. ITD is working with the agency's program IT staffs to identify and implement alternatives for their servers and data. The target date for completion is December 2018.

Performance Metric:

Required Reduction in Servers in non-tiered data centers	APHIS Goal
60% reduction	68% by December 2018

The criteria used to determine when a file server is retained in the field is based on the number of personnel at that location (20 or more) and network circuit speed. ITD will ensure that performance remains acceptable to employees working at locations where servers will be removed.

Strategy

Each file server in the field will use either Fort Collins, Colorado or Riverdale, Maryland as a COOP/DR site. Data stored on servers in the field will be replicated to the Nimble SAN. Below is an inventory of file servers in the field. Based on ITD's criteria, the plan provides a 68% reduction in the number of file servers located field offices. In order to ensure performance remains the same while working with documents, Microsoft's folder-redirection and offline-storage will be implemented prior to migration of data to hub site.

³ OMB M-16-19 – Data Center Optimization Initiative, August 1, 2016

APHIS Field Server Summary					
Program	Total Sites	Total Servers	Servers Retained	Servers Removed	Total Storage (GB)
AC	1	1	1	0	931
IS	28	34	30	4	67016
PPQ	103	127	28	99	534208
WS	27	30	3	27	172179
VS	21	22	4	18	78347
Shared Sites	24	37	14	23	144870
Total	204	251	80	171	997,551

vBrick FedRAMP Authorization

As part of DCOI, APHIS will move all of its applications to a Cloud provider by the end of the 1st Qtr of FY 2019. The platform will be able to be used by other USDA agencies.

VBrick is used to stream live television satellite feeds across the APHIS network. In addition, the vBrick platform is used to post streaming videos on the agency's website "my.aphis.usda.gov" by the Office of the Administrator and program offices.

Currently, there are 7 virtual servers in Riverdale that are used to perform these functions. By sponsoring the FedRAMP certification of vBrick, APHIS will be able to move these 7 servers to the vBrick's Cloud solution.

Data Management

APHIS has several initiatives underway related to data management that are considered critical by the agency's analysts to support research and enforcement activities.

Geospatial Applications

- Lines of Business – Population Health Management, Emergency Response, Mapping / Geospatial, Analytics
- Hosting – Esri cloud service environment on the AWS FedRAMP cloud

Background

The APHIS GIS community continues to research and identify opportunities to leverage existing technologies and implement industry best practices to rapidly deliver solutions to the agency's operational programs, enhance the user experience, and support decision-making processes.

Historically, APHIS relied on desktop GIS computing which limits the ability to share data or collaborate within the agency and individual programs. Recently, APHIS used the cloud-based Esri1, ArcGIS Online (AGOL) platform, for sharing GIS data. While this was a valuable step forward, AGOL is FISMA low certified, meaning that it cannot be used to collect, share, or analyze data that may be sensitive. Because of this, there was a need for an environment where all GIS data can be stored, shared, collected, and analyzed.

In 2017, APHIS received an authority to operate (ATO) a FedRamp moderate cloud GIS environment. This environment (APHIS GIS Cloud) gives the ability to share and use all GIS data, including sensitive data. To increase the utility of these new cloud-based applications, APHIS has made them accessible through the USDA network via E-Authentication. This option provides: multiplatform multi-platform support; the ability to share internally; high data availability; and scalable computing capabilities for analytical work. This platform also bridges the gap between GIS and non-GIS users, putting the power of geospatial data into the hands of managers and other employees not trained in the use of GIS. This APHIS GIS Cloud platform fills our current GIS needs and can be expanded to meet future needs as well.

As these new options became available to the federal GIS community, the APHIS GIS Steering Committee was established to provide oversight and guidance in the deployment of these valuable tools. While cloud GIS is still young, it has already provided opportunities for collaborative computing and access to enterprise GIS solutions. These efforts align closely with overall governmental policy to use cloud computing and to reduce overall spending in such environments. Using this cloud based platform and applications, such as, Collector, Survey 123, and ArcGIS Maps for Office (Excel Map extension) simplifies training needs for employees. Utilizing a single platform limits the scope of training requirements and allows employees to focus on topics important to their program and role within APHIS. Simplified workflows could also be shared between APHIS programs limiting the duplication of data and efforts. With little training users can collect, view, analyze, and print a map of their own GIS data from a web browser.

Alternatively, APHIS staff can use the ArcGIS Maps for Office tools (ie, self-service GIS) from their desktop to publish and work within the APHIS GIS Cloud platform. In addition, the



Figure 9. Cloud GIS structure

APHIS GIS Cloud platform allows for additional internal and external outreach opportunities through web map applications and tools and Story Maps. These web-based geospatial tools and applications have already been used for emergency response, situational awareness, surveillance, data collection and management, and communication with stakeholders.

APHIS uses a variety of mobile devices and geospatial workflows to support field operations, such as including: Collector for

ArcGIS (Collector), Survey123 for ArcGIS (Survey123), ArcPad, TerraSync, and other location-enabled devices (recreational GPS, GPS collars, and bar codes). These efforts will continue to evolve as new users come onboard, technology changes, and existing workflows become more sophisticated. Geospatial practitioners in Wildlife Services (WS), Plant Protection and Quarantine (PPQ), and Veterinary Services (VS) are exploring near real-time Successes with these mobile, data collection with the APHIS GIS Cloud and success with these technologies will accelerate adoption in other field-centric programs. The complete APHIS GIS Cloud platform supports a growing number of mobile clients and capabilities which are tightly integrated with the web users' experience and is supported on a wide range of devices, many of these bringing self-service GIS to traditionally non-GIS users.

Challenges

Challenges can arise from introducing new technology that shift traditional workflows, including staff education, acceptance, and migration of existing applications to new platforms.

APHIS will need to plan for and support skill development associated with desktop, cloud-based, and mobile GIS workflows, while accounting for an expanded user base of varying backgrounds and business needs. Training users in this new environment will be on-going as GIS continues to grow and expand in meeting the APHIS mission.

Alignment to APHIS IT Strategic Plan

IT Capability	Alignment
Provide remote, off-line collection of GIS data and entry of transaction data	Objectives 1.1, 1.2, 2.3
Support data exchanges across IT systems hosted on	Objectives 2.1, 3.1, 3.4

various platforms and providers	
The system will be hosted on a FedRAMP-certified cloud that's capable of being integrated with other solutions	Objectives 2.1, 2.2, 2.3, 3.3, 4.3, 4.4

The APHIS IT community continues to research and identify opportunities to leverage existing technologies and implement industry best practices to rapidly deliver IT solutions to the agency's operational programs, enhance the user experience, and support decision-making processes.

An APHIS GIS Cloud computing environment was developed given Authority to Operate January, 2017. While still young, it has already provided opportunities for collaborative computing and access to enterprise GIS solutions. Additionally, the government is strongly encouraging the use of cloud computing to reduce overall government spending on such environments. Esri FEDRAMP certified services that operates with E-Authentication has allowed APHIS to capitalize on these savings.

Requirements and Schedule

Business Needs	Functional and IT Needs	Major Milestones
Internal and external sharing of GIS data	Support multiuser and multi-editor environment	Completed planning 4th Q FY 2016
Ability to connect to multiple databases as well as create, edit, and modify data	Support network connected and network disconnected mobile GIS data collection tools	Complete design 4th Q FY 2016
Supports Windows, IOS, and Android	FISMA Low and FedRamp Moderate environments	
Integrates with Microsoft Office and SharePoint	Integrates with desktop GIS tools and software	Complete development 4th Q FY 2016
Ability to import and export data	Supports custom tool development and deployment	Implemented GIS Cloud 2nd Q FY 2017
Designed to be used by GIS practitioners, non-GIS users, and managers	Supports enterprise identity store, with the ability to customize permissions and user roles	

<p>Functionality to support interactive reports, and work summaries through a dashboard or Story Map web application or similar</p> <p>Supports FGDC and ISO metadata standards</p>	<p>Elastic storage space available</p> <p>Accessible inside and outside the USDA network securely</p>	
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Strategy

Geospatial information is an integral part of the APHIS business model, and its impact on decision making continues to grow. To meet and adapt to user needs, APHIS must continue to increase GIS capability for business functions, optimize the use and value of GIS, and develop a spatially aware workforce.

Through the GIS Steering Committee, APHIS will work with USDA to ensure that needed tools are negotiated favorably into USDA's Esri Enterprise License Agreement (ELA). APHIS will encourage programs to spatially enable program data, and through the Committee, provide implementation guidance. APHIS IT will work through the GIS Steering Committee to highlight success to APHIS Administration through the Program Leaders Group (PLG) or APHIS Management Team (AMT) when appropriate. Further, APHIS will continue to strengthen IT resources to support cloud GIS workflows, such as increasing band width when needed, and mobile device technical support.

To optimize the value of GIS, success will be highlighted through reporting and outreach, and common tools will be shared to reduce duplication of effort. Programs will work together and with Esri, to create workforce development plans, support training across the agency, and conduct outreach on the benefits of spatial thinking into the important mission-related work the agency provides.

By actively increasing GIS capabilities and accessibility, APHIS will benefit from a cohesive GIS strategy that will improve efficiencies and improve our abilities to fulfill the agency's mission to protect and promote food, agriculture, natural resources, and related issues.

Big Data

IT Capability	Alignment
Provide high-speed access to data and analytical tools	Objectives 1.1, 1.2, 2.1, 2.2

APHIS is in need of overarching and scalable IT solutions for scientific computing environments to ensure, now and in the future, labs and scientists have access to the appropriate IT resources

and tools, can efficiently exchange data among colleagues for research purposes, and can secure and back up invaluable data to prevent loss or damage.

In April 2017, the AMT supported and the programs funded an initiative to assess scientific computing in APHIS. APHIS contracted Cherokee Nation System Solutions (CNSS) to assess scientific computing in the Riverdale, MD; Beltsville, MD; Ames, IA and Fort Collins, CO facilities and to review the VS Science, Technology and Analysis Services (STAS) assessment by BioTeam. Included in this section are CNSS' findings, including the challenges they identified, their gap analysis, and their recommended short and long-term strategies to assist APHIS with its Big Data initiatives.

CNSS based their findings on in-person interviews conducted at Ames, IA, Ft. Collins, CO, Beltsville and Riverdale, MD and numerous field sites via teleconference and WebEx with representatives from APHIS leadership, division directors, scientists, lab-techs, and IT staff. CNSS focused the interviews on reviews of relevant documentation, and IT computing, data storage, and networking equipment.

The proposed ARS Scientific Converged Infrastructure Network (SCINet) is a COTS and cloud-based solution hosted on AWS. A key benefit of the AWS platform is the wide range of analytical tools that APHIS's scientific staff would have access to.

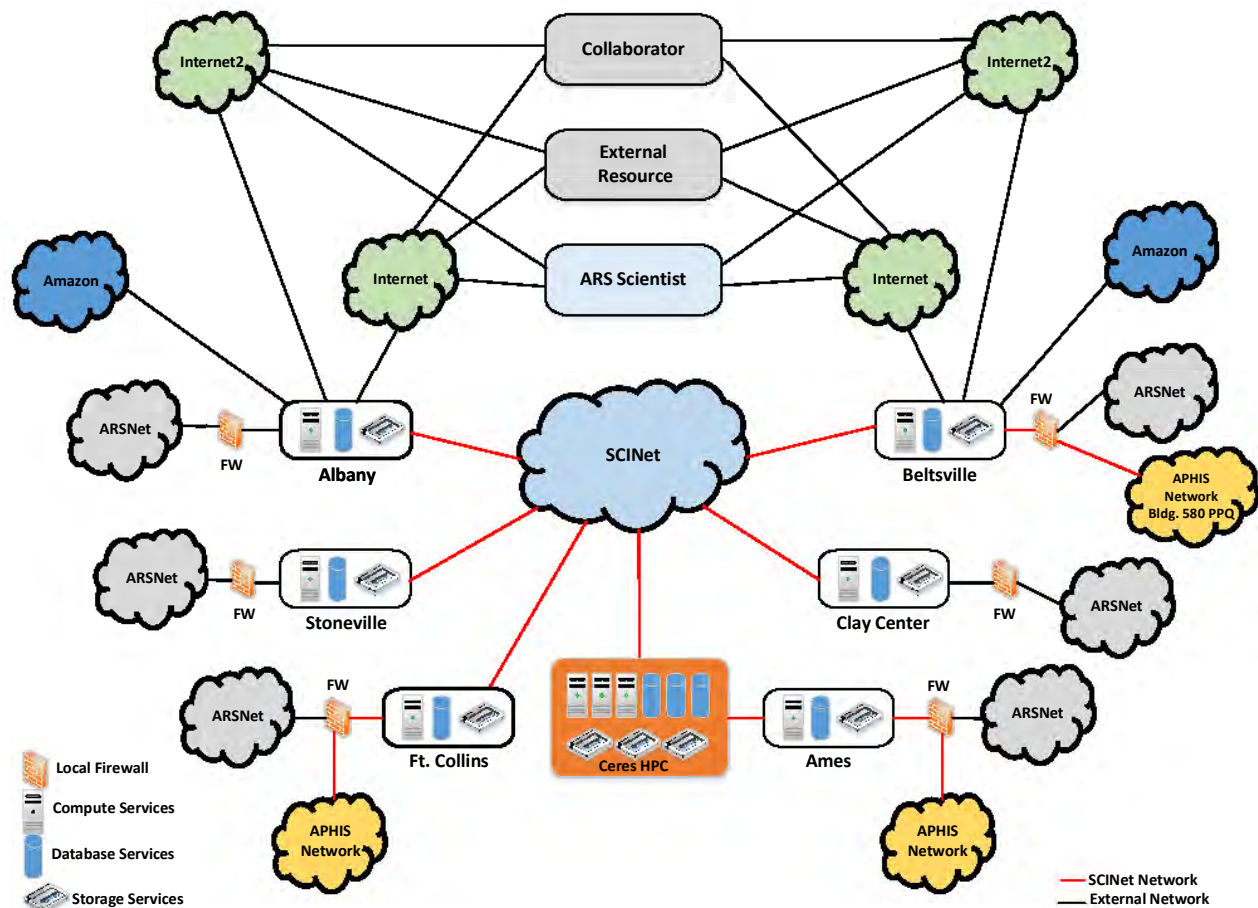


Figure 10. ARS SCINet Architecture

Challenges

In general, APHIS scientists find scientific computing is no longer well served by local or enterprise computing resources as storage is limited, resources do not scale well to manage surges, outlying offices have major connection challenges; these limitations impede timely processing, collaborative analysis, and tool sharing among departments and our stakeholders.

To mitigate these challenges, scientists continue to find ways to reclaim IT assets to get around the lack of available storage. They need a more effective, dedicated scientific information technology environment that provides sufficient capacity, performance, information assurance, security, resilience, continuity of operations, and disaster recovery capabilities to support modern scientific workflows.

Challenges identified by CNSS include:

Agency Scientific Information Technology Support/ Oversight

- Not all sites have access to the same tools. Some sites are experimenting with the SCINet, Amazon Web Services Cloud (AWS), and Microsoft Azure Cloud while others do not have access to these tools.
- There is a lack of dedicated scientific IT support staff to maintain the scientific IT environment. Resources are needed to assist scientists with effective use of the scientific IT environment, software optimization, cloud solutions, and development of scientific tools and workflows.
- There is no APHIS permanent big data leadership that can set scientific IT policy, an acquisition strategy, and a detailed plan for optimizing, consolidating, and migrating systems. APHIS lacks central scientific direction to help guide IT in creating meaningful agency-wide programs/infrastructure.

Hybrid Cloud

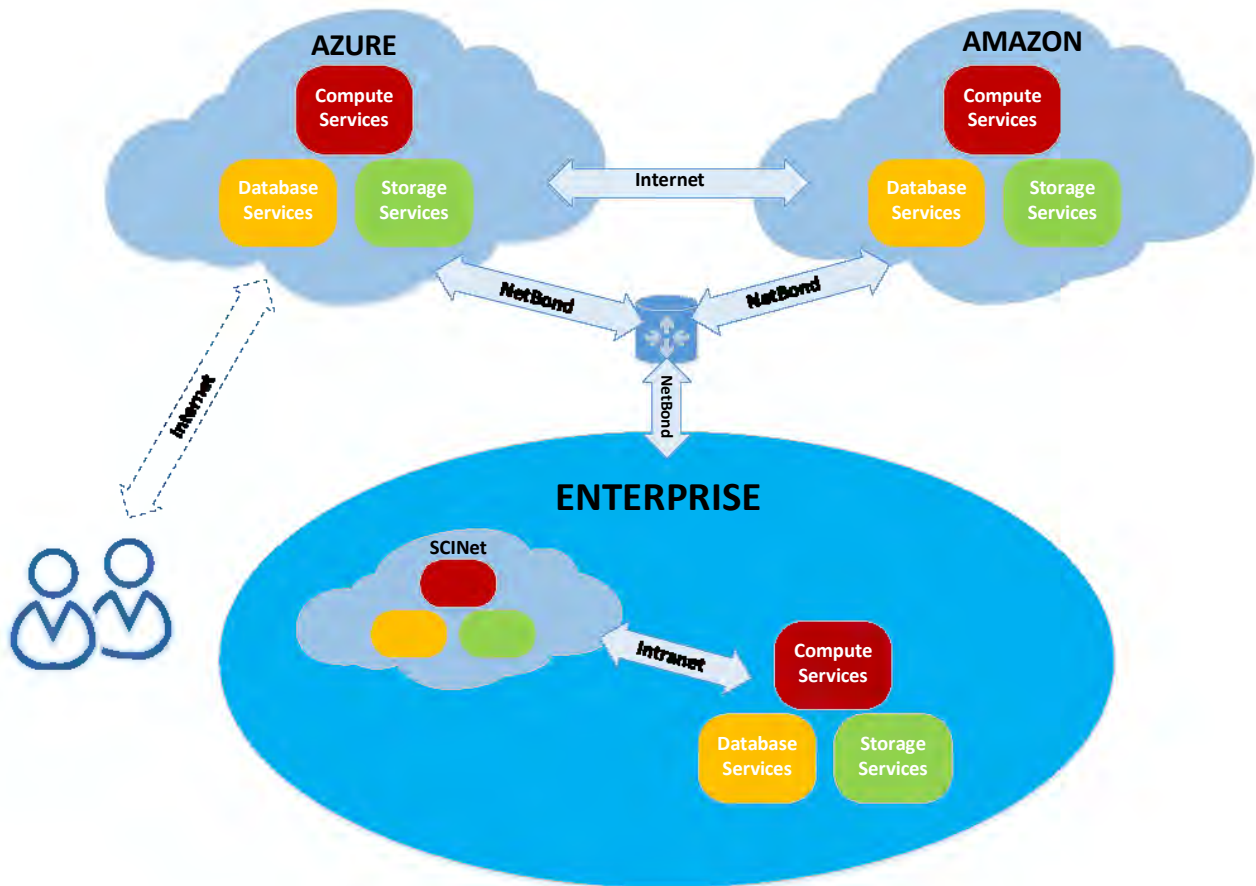


Figure 11. APHIS Hybrid Cloud

Data Storage and Management

- The growth of scientific data is outpacing the ability for current Enterprise IT to keep up on its legacy storage systems, in some programs the growth trend is over 200% annually. Additional data storage capacity is needed in order to meet all big data requirements.
- Data storage collection, consolidation, management, access, and sharing suffer from multiple challenges of storage and communication capacity, timeliness, redundancy, security, and related problems.
- Communication and storage issues ranging from moving data around digitally in elaborate workaround schemes to time-consuming portable storage device shipping are impeding sharing / collaboration.
- Confidentiality, integrity, and availability are at risk on numerous, unsupported portable storage devices, and ad hoc computing environments utilizing repurposed workstations that are sometimes disconnected from the enterprise IT environment to avoid updates that induce processing interruption. In addition, these devices are not subject to APHIS Continuity of Operations (COOP) and pose security risks.

Access

- Lack of access to open-source tools has proven to be a challenge for APHIS Enterprise IT and a long, frustrating process for scientists. For instance, there are tools that VS is using that PPQ was told they could not.

Connectivity/ Speed

- Network connectivity is hampering numerous scientific endeavors for multiple programs at several of the field sites. Sharing data, software code, and experimental methods are the backbone of gathering the range of observations, confirming scientific results, and translating research to speed up discoveries and identify large-scale trends. In some instances, the big data files created in the field are too large to transport in a timely manner across the existing Enterprise Network. Other alternatives need to be investigated.
- CNSS identified gaps that may require program level solutions that may not be met by the recommendations at the enterprise level. The programs will work with ITD to address these gaps.

Strategy

The Big Data Working Group is seeking the AMT support and funding for the recommendations outlined in the cost table below. In order to ensure policies and technologies align with current and future needs, it is essential that the Chief Scientific Information Officer (CSIO) and the Chief Data Program Manager (CDPM) be hired.

The CSIO will assess scientific disciplines and the current systems in order to document requirements, develop plans and recommendations for a cohesive approach for nationally coordinated, multidisciplinary data. This individual will provide strategic leadership for data collection, storage, analysis, integration and distribution of scientific data.

The CDPM will provide leadership in planning and development of a Big Data system that integrates and utilizes computationally-intense methods of High Performance Computing (HPC) and Cloud-based architecture to successfully manage the increasing large and complex volumes of information from vastly different formats and sources that are compiled, stored, exchanged and analyzed at an escalated pace, for vast array of objectives.

The CSIO and CDPM will work closely with ARS on any upgrades of the ARS SCINet computing and data management infrastructure to ensure program requirements are met and will provide leadership to develop tools and systematic improvements to enable scientists to perform their work with state-of-the art technologies.

Next Steps

Upon approval of funding requests; the working group will work towards implementation of the recommendations outlined in the CNSS report and the VS STAS report. A project manager from one of the Programs should be assigned to help coordinate all the activities outlined below.

- Hire Chief Scientific Officer and Chief Data Program Manager
- Work with programs to identify all scientific software and submit a bulk exception request for software approval.

- Work on connecting the APHIS network to SCINet. This includes security and network activities.
- Develop Statement of Objectives for the HPC build out in Ames; and procure hardware and services to implement solution.
- Work with programs to address program specific requirements

Based on the analysis in the findings and available technology, CNSS recommends that APHIS continue to use and expand its partnership with Agriculture Research Service (ARS) and SCINet for their scientific information technology environment.

- Leverage existing and planned infrastructures like SCINet to support Big Data
- Collocate with agencies like ARS who have a substantial investment in Big Data where there is mutual benefit
- Adopt Hybrid Cloud Technologies (AWS)
- Innovative Software and Solutions that APHIS is not yet using
- Address Resource Gaps
- Chief Science Information Officer
- Chief Data Program Manager
- Scientific/IT Customer Support

CNSS recommends that APHIS continue to develop the Microsoft Azure Platform as its Enterprise IT infrastructure. AWS is more conducive to scientific computing given that APHIS can take advantage of the modular design that enables “serverless” computing, allowing scientists to concentrate on building models for their analysis and not infrastructure.

SCINet currently takes advantage of AWS with their hybrid-cloud to surge computing power and services on-demand as needed. APHIS can take advantage of the AWS platform to make cloud-based infrastructure available on demand, which would lower costs and allow scientists to use computing power only when needed. These hybrid initiatives empower APHIS scientists and satisfy DCOI requirements that all applications hosted in agency data centers be migrated to the Cloud by December 2018.

Data Warehouse

IT Capability	Alignment
Provide data warehousing solution	Objectives 3.1, 3.3, 3.4

APHIS is responsible for protecting and promoting U.S. agricultural health, administering the Animal Welfare Act, and carrying out wildlife damage management activities. As part of APHIS, VS protects and improves the health, quality, and marketability of our nation's animals, animal products, and veterinary biologics by preventing, controlling, and/or eliminating animal diseases, and monitoring, and promoting animal health and productivity.

VS obtains and utilizes data integration, analysis, and presentation software to support its animal disease surveillance, traceability and emergency response missions. VS analysts are responsible for utilizing all the data collected for this purpose to produce actionable intelligence.

Strategy

VS plans to utilize a cloud-based solution that has the required capabilities to support data integration, analysis, and presentation capabilities for its data systems and stand-alone data sets. The end result will be the presentation through a single user interface of integrated data in the format(s) best suited for analysis of each data set, e.g. statistical reports/spreadsheets, graphs and charts, geospatial plotting.

Specifically, the solution will support:

- Integration of twelve VS data systems and three stand-alone data sets
- Nationwide standard and ad hoc reporting capability and analysis of integrated systems/data
- Visualization of integrated data
- Geospatial projection of integrated data

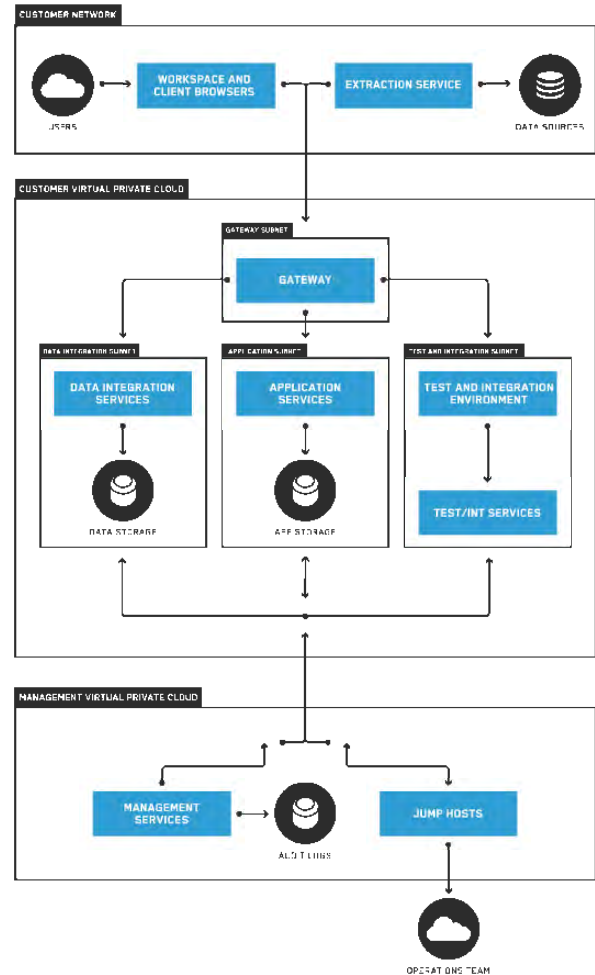


Figure 12. Proposed solution architecture

Maintenance of APHIS Enterprise Infrastructure

APHIS will continue to maintain its file and print servers and manage common software suites such as databases.

APHIS Server Infrastructure Architecture

APHIS Server Infrastructure consists of services, hardware, software, personnel, functions, activities and responsibilities that are providing midrange computing services in the agency, and are installed in our Data Centers' (Fort Collins, Riverdale and Ames). This includes services, hardware, software, and management services (including virtualization).

Below is an outline of the current midrange computing services, and operating environments within the agency.

Server Platforms

APHIS has a variety of server platforms that are used in our Data Centers. Our strategy has been to migrate most platforms to a virtual environment by means of hypervisor virtualization software. This reduces the overall footprint in the computer rooms and simplifies overall support. Current platforms are:

- Cisco Unified Computing System (UCS)
- Virtual Hosts
- HP Blade Servers (these servers are in the process of being retired. The remaining Oracle Servers either need to be moved to a new blade server on the Cisco UCS or moved to Azure when feasible.)
- Dell Rack Mount Servers
- Bro Server for ISB (used to identify PC's with NAT IP)
- Cisco VoIP UCS
- VBrick Rev UCS (Used for Video Streaming)
- IBM Server (SolarWinds)

Operating systems

APHIS has standardized on the following Operating Systems. This is documented in the APHIS Assessment and Authorization (A&A) for the APHIS Enterprise Infrastructure (AEI).

Microsoft Windows	RedHat Linux
Windows 2008 (being retired)	RedHat 5.4
Windows 2012	RedHat 6.5
Windows 2016	RedHat 7.3

Server Virtualization

APHIS uses VMware hypervisor to virtualize servers in datacenters. The VMware platform enables the agency to manage all server provisioning, with a single view for management of all virtual servers. Current versions include:

- Build 5.5
- Build 6.0.2u1

Server Management Suites

In order to manage the Server Platforms, APHIS uses a variety of tools to ensure proper operation of platforms. This allows the team to provision, and de-provision servers/services, monitor server health, manage resource optimization (memory, CPU, storage i.e.) and patch the systems with new releases and security updates.

Windows	RedHat	VMWare
System Center Configuration Manager (SCCM- Hosted By NITC)	Centrify	VMturbo
SolarWinds		vCenter
BigFix		vRops
Forescout		Veeam
Cisco UCS Manager		
HP Infosite Manager		

Server Lifecycle Support

Typical lifecycle replacement for server hardware platforms is every 4 to 6 years, this is based on industry standards and vendor recommendations. Lifecycles vary based on vendor, manufacture date, and timeframe they were brought online by the ITD staff. The lifecycle replacement clock begins when the hardware is installed and on the network.

Core Services

Data Services

Enterprise storage is under close scrutiny at this time as the existing storage infrastructure is due for lifecycle replacement. Furthermore numerous storage workloads are scheduled to move to third party environments as part of the APHIS Cloud Migration Project. Key goals in the future will be to optimize the storage and backup environments, integrate data storage solutions with third party environments and establish a storage and backup roadmap that facilitates user mobility and aligns to Federal Big Data Strategies.

Current		Migration	Future
<p>Baseline Environment</p> <p>Cisco Nexus 8gb Switch (connect to Pillar Axiom 600) Oracle FS-1 (MD, FC, NC and IA) Tintri T620 Virtual Desktop Storage Storagetek L700 Tape Library (LTO tape drives 3/4) Spectra Logic T120 Tape Library (LTO tape drives 5/6) FalconStor Virtual Tape Library (VTL) (MD, CO, NC, IA) FalconStor Continuous Data Protection (CDP) (MD, CO) Data Protection Servers (Netbackup) (MD, CO, NC, IA) Enterprise Vault VM servers (CO and MD) Clearwell E-Discovery Appliance (CO) Encase Forensics server – HP Blade server</p>		<p>Tactical Deployment</p> <p>LTO 3/4 Backup Images to LTO 5/6 Netbackup Servers to 5230 Appliances Encase Forensics server – Cisco UCS</p>	<p>Strategic Direction</p> <p>Cloud Storage Object Storage for Unstructured File Data Oracle FS-1 Series SAN Solid State Disk (Flash Storage) Big Data Analytics 16g FC iSCSI 10 GB</p>
<p>Retirement Targets (1-6 Months)</p> <p>Storagetek L700 Tape Library</p>		<p>Preferred</p> <p>Brocade Fiber Channel Switches 16gb/32gb FC iSCSI 10 GB Oracle FS-1 Storage Veritas Netbackup 5230 Appliance Exablox Object Storage – Deduplication/Encryption/Continuous Data Protection (CDP)/Replication Cloud Storage Vendor</p>	
<p>Sunset Targets (6-18 Months)</p> <p>StorageTek L700 Tape Library Netbackup IBM Servers FalconStor VTL</p>			<p>Emerging</p> <p>Cloud Storage (Third Party Vendor) Hyper Converged Infrastructure Object Storage Big Data 32gb Fiber Channel Capability 40gb iSCSI/NFS/CIFS Capability</p>

Figure 13. Storage and data protection hardware

Current		Migration	Future
<p>Baseline Environment</p> <p>Veritas Netbackup (NBU) 7.6 Veritas Enterprise Vault 10.0.3 Veritas Operations Center 7.6 Spectra Logic BlueScale 12.4.1 Pillar Axiom Pilot software 3.4.18 Tintri Software 4.1.0.6 FalconStor VTL/SIR software 7.5 FalconStor CDP 7.8 Clearwell E-Discovery 8.1 EnCase Forensic 7.0.6.01.14 EnCase E-Discovery Command 5.2</p>		<p>Tactical Deployment</p> <p>Upgrade NBU to 7.7 (LINUX RH OS) Upgrade Veritas Enterprise (EV) Vault to 12 Upgrade Veritas Operations Center to 7.7 Upgrade Spectra Logic BlueScale to 12.6 Upgrade Tintri OS to 4.2.0 Upgrade EnCase Forensic to 7.12 Upgrade Encase E-Discovery Command to 5.8</p>	<p>Strategic Direction</p> <p>Cloud Self Service Restores (Shadow Copies) Data Management Policy</p>
<p>Retirement Targets (1-6 Months)</p> <p>Veritas Netbackup 7.6 Veritas EV 10</p>		<p>Preferred</p> <p>Veritas Netbackup 7.7 (LINUX RH OS) Data Management Policy Information Life Cycle Management (ILM) Veritas Operations Center Analytics 7.6 (Advanced Reporting) Symantec Enterprise Vault 12 Exablox OneBlox software (Object Storage) SAN Switch that provides GUI management</p>	
<p>Sunset Targets (6-18 Months)</p>		<p>Emerging</p> <p>Enterprise ILM, SRM and HSM Policy and Capability Mature Data Center to Data Center BURA Functionality Cloud Storage (Third Party Vendor) Hyper Converged Infrastructure Object Storage Big Data 32gb Fiber Channel Capability 40gb iSCSI/NFS/CIFS Capability</p>	

Figure 14. Storage and data protection software

End User Computing

Within the near term there will be substantial changes within the end user computing environment as APHIS moves to align itself with more up to date vendor offerings of both user

class applications and Operating Systems. Greater incorporation of multi-agency shared services and contract vehicles, will be used to align the operations and maintenance practices, end user infrastructure and user mobility technologies, with those of the Department.

Directory Services

Within the tactical timeline, APHIS will finalize migrations of legacy domain objects to the Enterprise Domain environment provided by USDA. Concurrent efforts to evacuate the remaining workloads from the legacy environment into cloud service provider resources are underway and will serve as the final step preceding the retirement of APHIS managed domain spaces. Identity access management and identity federation initiatives are emerging spaces, as not only APHIS but USDA OCIO as well, are both embracing greater user mobility and clouds based technologies.

Technology Platforms

Database Platforms

Database Management Systems: Database technologies are a core component to business critical services and will be undergoing a process of evolution during the tactical and strategic timelines. This evolution is in part mainly due to the momentum of the APHIS Cloud Initiatives and will bring the organization into technology and management spaces that are new and foreign. A heavy investment into the human capital resources will be required to enhance the skillset of the IT workforce in order to meet the emerging demands. Opportunities for further consolidation and optimization of on premise Database environments reside within the plans as well, although there is risk of resource over commitment due to the emerging technology demands.

Virtualization Platforms

Virtualization: Virtualization Technologies are in use within APHIS but the organization has yet to capitalize on virtualization within the areas of Desktop and Application virtualization as a compliment to server virtualization. Desktop Virtualization use cases support several APHIS and USDA goals spanning the realms of User Mobility to Information Security. APHIS plans to capitalize upon the anticipated Enterprise Licensing agreement with USDA OCIO in the future. Projects will be forthcoming to drive efficiencies in the usage of infrastructure and monetary resources, by driving VMware Consolidation initiatives within the agency.

Application Platforms

Microsoft application platforms are subject to the largest fundamental changes on the operational, tactical and strategic calendars. It's imperative for APHIS to appropriately resource and invest into the multitude of Microsoft service offerings and the staff supporting those offerings, in order to accomplish the Strategic Goals of this organization. Microsoft stands to be the Cloud Service Provider of choice of the Department; the platforms and infrastructure supporting this will be maturing within the tactical and strategic timelines. Integration capabilities, robust management tools, comprehensive services and overarching Federal Governance makes Microsoft Platforms and technologies one of the few vendors that addresses the requirements of many of our large scale initiatives.

Telecommunication Services

The Telecommunications Services will primarily remain the same except where different services become available. Some productivity modules within ServiceNow will be utilized, for example the Financial and Asset Management modules, to streamline and centralize billing and account management as well as all telecommunications assets. Key goals in the future will be to optimize all processes and procedures to be sure APHIS can support various program financial expectations and ensure maximum productivity in each telecommunication areas of expertise within the TMACO. Also, work with USDA to ensure APHIS aligns with Department initiatives and strategies in the coming years.

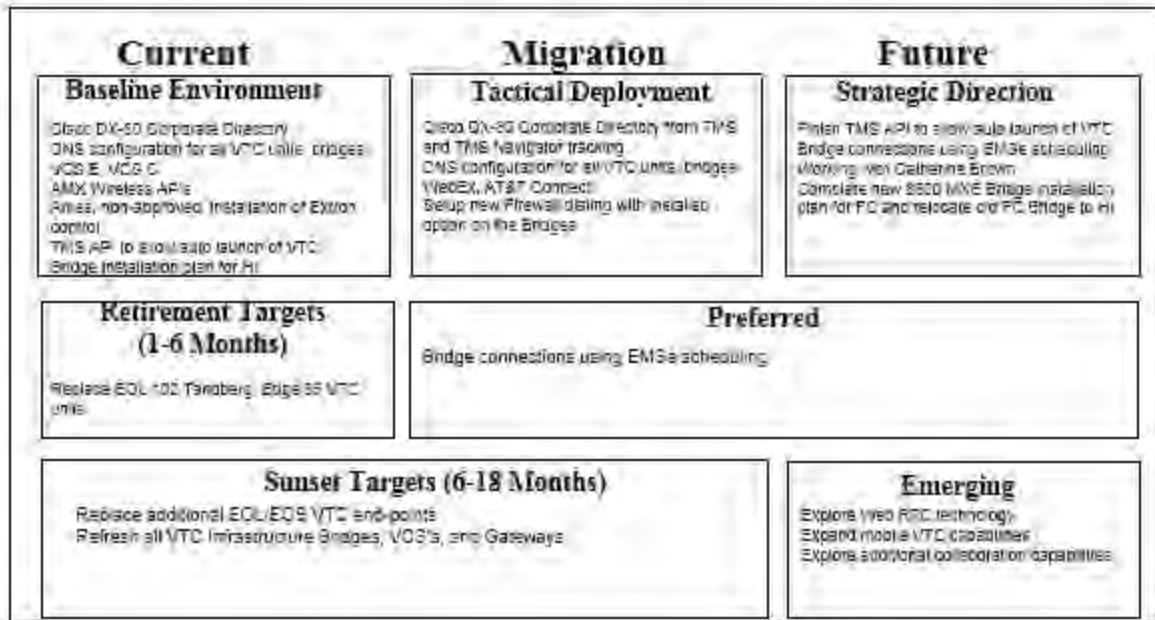


Figure 15. VTC architecture strategy

Network Engineering Services

The challenges of the Network engineering services is to align with the APHIS ever changing landscape of users and field site requirements. In the next fiscal year APHIS will be meeting with vendors and partners to understand new technology offerings in the network engineering technology area to be able to integrate cutting edge solutions within APHIS where ever they're needed. Greater incorporation of multi-agency shared services and contract vehicles will be used to align the operations and maintenance practices, end user infrastructure and user mobility technologies with those of the Department. One of the unique challenges of this technology is making sure that the maintenance is up to date with the correct licensing and contracts to ensure business continuity, reliability and uptimes align with APHIS missions.

Advanced Technology Services

Advanced Technologies such as VoIP, Video Teleconferencing and Network Security are very integral to the success of APHIS program missions. These technologies drive such things as Telework, program field mobility and cost effect communication and collaboration across the agency. FY17 and beyond will require the advanced technologies to be innovative and even more flexible as the APHIS workforce becomes increasingly mobile into rural areas demanding

efficient use of technology to remain connected and productive anywhere their jobs take them. Investments will need to be made in technology improvements, workforce training and understanding of what our customers need to fulfill their missions for APHIS.

Voice over IP & Video

Voice over IP & Video technologies are a core component to business critical services and will be undergoing a process of evolution during the tactical and strategic timelines. This evolution is in part mainly due to the momentum of new features and capabilities and telework initiative drivers that will bring the organization into technology and management spaces that are new. A heavy investment into the human capital resources will be required to enhance the skillset of the IT workforce in order to meet the emerging demands.

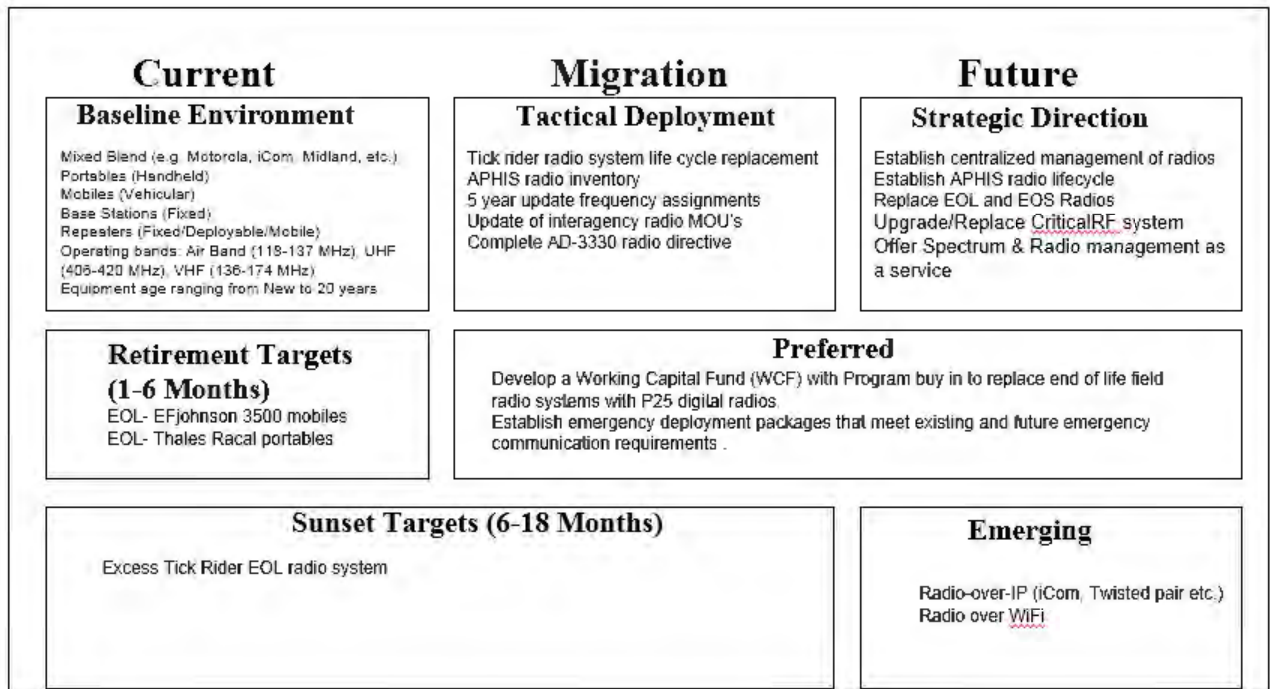


Figure 16. UHF/VHF radio architecture strategy

Network Architecture

Many network architecture technologies are deployed within APHIS today including MPLS, Broadband, 4G LTE wireless and cable modem to be able to get connectivity out into the field for meeting the strategic goal of making sure that every APHIS employee has the same experience no matter where their jobs are performed. APHIS will continue to align with new technologies requirements looking for ways to get more cost effective and higher performance connectivity to end users in the future.

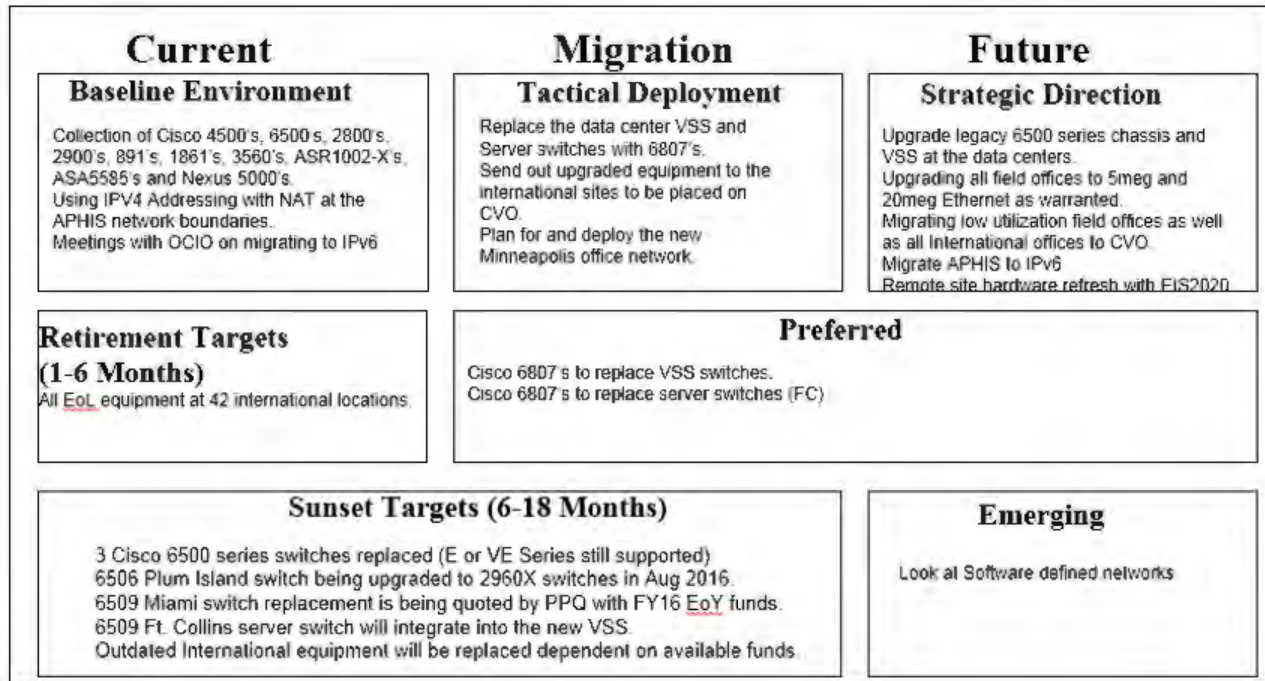


Figure 17. Network architecture strategy

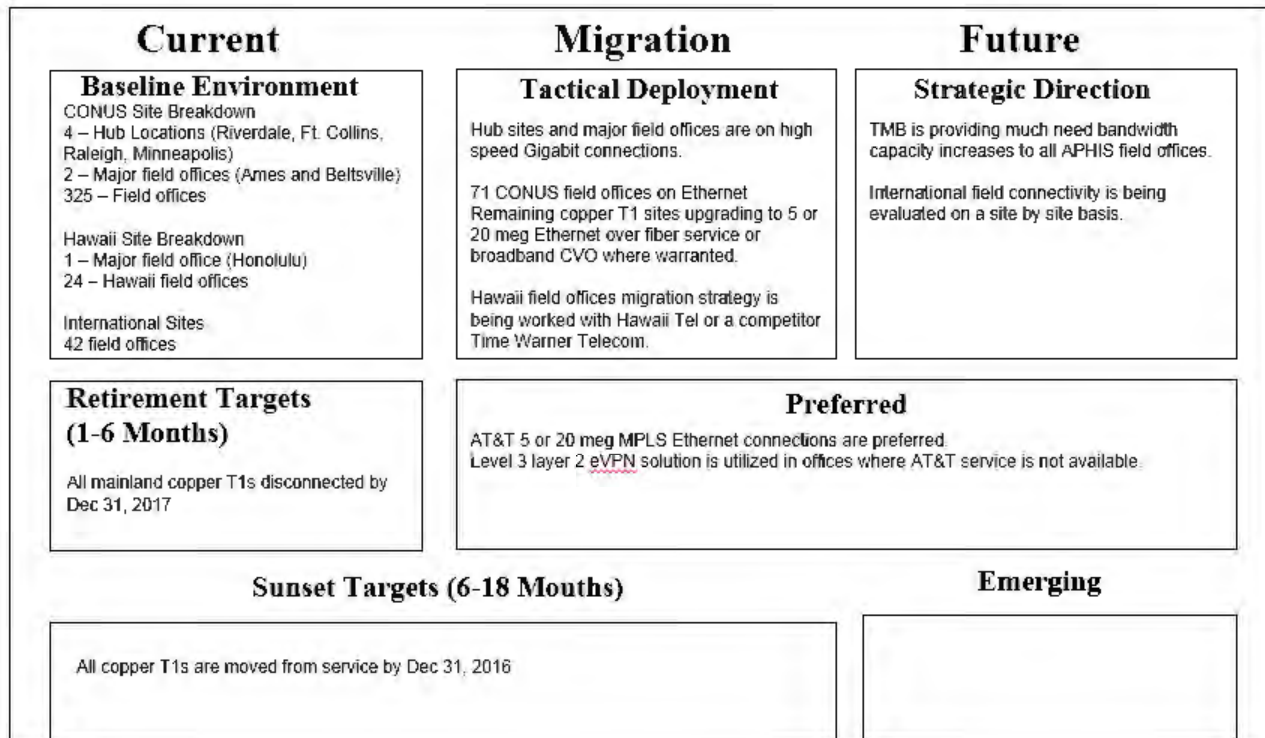


Figure 18. Connectivity Strategy

Security Architecture

Security Architecture platforms are subject to the largest fundamental changes in the operational, tactical and strategic areas due to the Continuous Diagnostics and Mitigation (CDM) program rollout schedule. It's imperative for the success of this overall initiative that APHIS provides resources and invests in staff to support the security installed in order to accomplish the Strategic Goals of this organization.

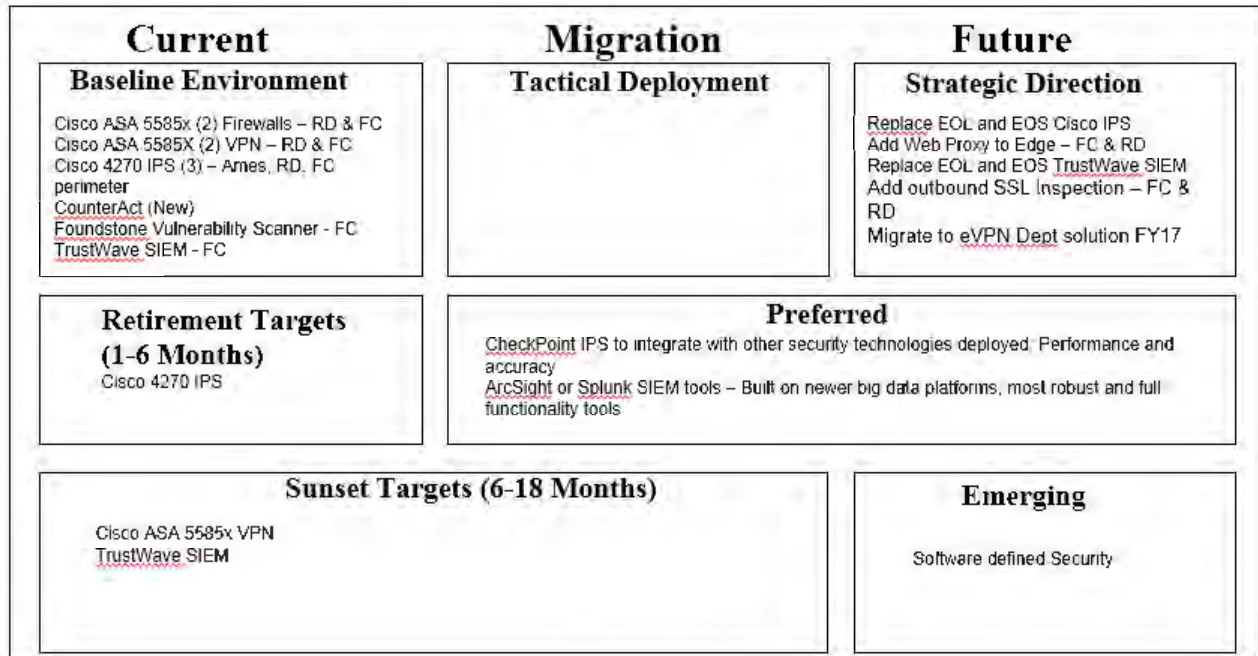


Figure 19. Network security architecture strategy

APHIS IT Systems

A more complete understanding of the agency's IT investment portfolio and its supported IT systems and components has been achieved as a result of investment portfolio reviews held in the 4th quarter of FY 2017. Ongoing annual reviews of the IT investment portfolio will position APHIS to achieve savings through reuse of capabilities, product licenses, and other resources as well as to fully leverage cost-saving strategies in shared services and cloud computing.

To accomplish the agency's mission, APHIS relies on more than two dozen IT systems and numerous software applications and components⁴ to deliver automated IT capabilities to its employees and stakeholders.

In compliance with OMB⁵ to reduce the number of data centers, the APHIS CIO directed program IT staffs to relocate their IT systems to the USDA National IT Center (NITC). This has been completed for most of the agency's IT systems and applications.

Although NITC provides managed infrastructure and hosting platforms, it lacks the benefits of commercial IaaS and PaaS features such as:

- Seamless provisioning of network bandwidth, servers, and storage
- Performance metrics such as percent uptime; average response time, peak and average usage
- 24/7 monitoring
- Automatic application of security and software updates

With its selection in FY 2014 of Salesforce PaaS, Force.com, as the platform solution for the APHIS eFile application, APHIS initiated a move towards utilizing commercial cloud services to provide business-ready capabilities and hosting of IT systems.

In addition to ongoing development of APHIS eFile in FY 2018, APHIS:

- Established an APHIS-wide community of interest (COI) to move GIS applications to the Esri Managed Cloud Services solution
- Deployed an application in Salesforce cloud to replace its legacy Employee Qualification System (EQS)
- Sponsored FedRAMP authorizations for vendors whose cloud services were determined to be beneficial to APHIS such as SpringCM
- Is currently working with USDA OCIO to test Microsoft Azure Cloud to host agency IT systems and applications

⁴ An inventory of APHIS IT systems and major components is provided in Appendix 4. An inventory of software applications residing on APHIS servers is maintained by the Information Management Division (ITD) Technology Management Branch (TMB).

⁵ In December 2010, OMB issued its *25 Point Implementation Plan to Reform Federal Information Technology Management*. The plan mandates the consolidation of data centers to reduce overall redundancy and to optimize use of computer facilities.

- Is planning for replacement of the legacy Management Information System (MIS) with an integration of cloud-based solutions

Challenges

As of 2016, more than 45% of APHIS's IT systems were nine years old or older, with the oldest in operation since 1994.⁶ Older IT systems are typically migrated to newer hardware and software platforms while still supported by vendors. These incremental changes can also require changes to underlying code. However, without a complete reengineering of an IT system, an organization could fail to benefit from newer technologies such as cloud computing, shared services, and enhanced security.

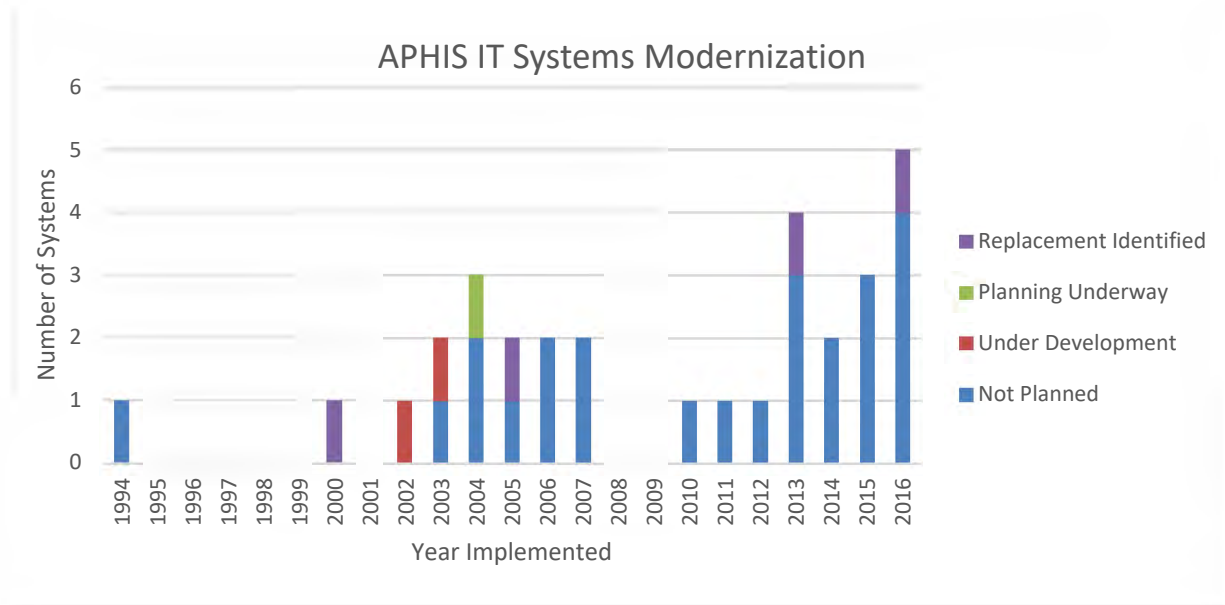


Figure 20. Legacy IT system age distribution

Progress towards modernizing APHIS's IT systems is expected to continue at a moderate pace.

The table below reveals a slight decrease in planned spending on development, modernization, and enhancement (DME) for transaction systems between FY 2016 and FY 2017. Funding constraints in prior fiscal years and potential reductions in funds for FY 2018 can impact rate of adoption of new technologies and shared services, modernization of applications, and improvement of data quality.

⁶ IT systems funded through cooperative agreements with North Carolina State University are not classified as being owned by APHIS and were not included in the calculation. Several APHIS IT systems include multiple applications or components, each of which could have been placed into production in a later year or possibly an earlier year. This chart is based on the earliest known date for each IT system.

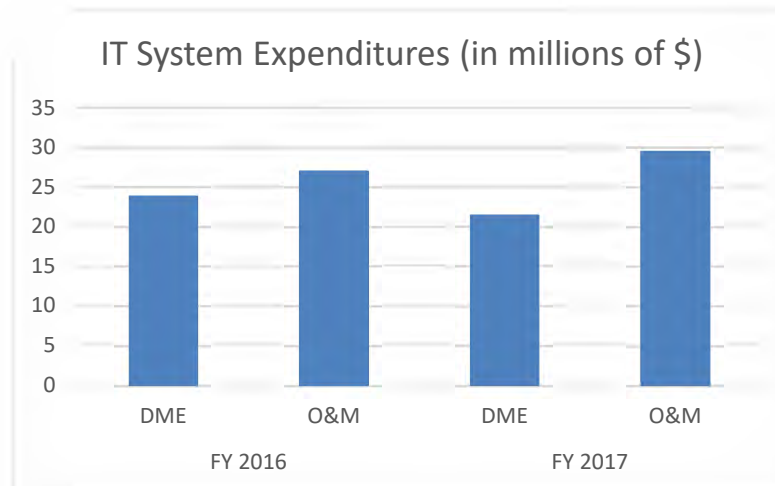


Figure 21. Spending on IT systems

Strategic Direction of IT Systems and Applications

In 2017, the APHIS CIO commissioned a study by Salesforce of the agency's IT systems and applications.

The deliverable from the study provided a comprehensive assessment of the fit between business capabilities being delivered by the existing portfolio and capabilities that can be achieved through adoption of readily-available applications and custom-developed applications on the Salesforce platform.

The Salesforce platform might not be the best solution in all instances, even in those situations in which the platform was rated as a good fit. However, the TRB will ensure that it is among the solutions included in alternatives analyses submitted as part of new IT system proposals.

In many situations, development of a system or application to replace a legacy one isn't necessary or cost effective, even in the Salesforce environment. However, the APHIS IT community continues to search for cost savings, and private cloud providers are being considered as a potential strategic move.

With the anticipated security authorization of APHIS Azure cloud, APHIS program offices are preparing to migrate several IT systems and applications to it, which offers a cost-effective solution for hosting when compared to NITC.

Significant IT System Initiatives

The following projects are either currently underway in APHIS or approved to initiate planning in FY 2018. These impact IT systems and applications that support issuance of authorizations to the public and activities related to safeguarding agriculture and the environment. Other projects are focused on data quality, integration, and analysis; standardization of GIS solutions; and migration of IT systems to public cloud platforms.

Issuance of Authorizations – Permits, Licenses, etc.

Overview

APHIS is charged with protecting the health and value of American agriculture and natural resources from the introduction of destructive plant and animal diseases and pests. These efforts support the overall mission to protect and promote agriculture and natural resources.

APHIS issues a variety of certificates, accreditations, registrations, permits, and other licenses (CARPOL) that ensure the safe movement of regulated agricultural articles into, out of, and through the United States.

APHIS performed a BPA project to determine the feasibility of using one IT solution to support its CARPOL business domain. The BPA revealed extensive redundancies among the business processes and associated activities used by several operational program areas as well as among the IT systems supporting those processes. As a result, senior APHIS management determined that an enterprise-wide IT approach supporting its CARPOL activities was justified.

Due to the rising costs and the inefficiencies of having so many different systems, it is no longer feasible for APHIS to continue to develop and maintain multiple IT systems that support similar CARPOL activities. Since all of the current systems have commonalities in their business workflows, APHIS is looking to gain efficiency through one comprehensive IT system for all CARPOL activities.

An integrated CARPOL solution supports APHIS staff in managing CARPOL-related activities such as inspection, validation, compliance enforcement, fee collection, audit, investigation, case management, file management, analysis, document creation, and information management.

Business Reference Model 3.1 Alignment		
Permits and Licensing	Global Trade	Population Health Mgmt
<p>Overview</p> <ul style="list-style-type: none"> • Systems – ACIS, CTIS, ePermits, LSRTS, PCIT, VECHS, VSPS • Program(s) – AC, BRS, PPQ, VS • Host Locations – NITC, NCSU • Data Sharing - None 	<p>Challenges</p> <ul style="list-style-type: none"> • Includes over fifty unique workflows • Extensive set of internal and external stakeholders • Limited documentation on legacy systems and/or data • Potential for data quality issues • Broad array of regulations, trade agreements and policies 	
<p>Drivers</p> <ul style="list-style-type: none"> • Shared vision across programs of CARPOL function • Implement a single IT solution • Improve data quality and increase data sharing/reuse • Leverage benefits of FedRAMP commercial cloud providers and shared services 		<p>Requirements for Success</p> <ul style="list-style-type: none"> • Long-term funding agreement across programs • SMEs available for requirements gathering and testing • Technical staff knowledgeable of Salesforce • Experienced contractor services for development and implementation
<p>Targeted Technologies From Roadmap</p> <ul style="list-style-type: none"> • Cloud Services – Salesforce, esri • Shared Services – eAuthentication, eSignLive, pay.gov • Data Sharing – ITEMS, ACE/ITDS – via ARM (using NIEM) 		
<p>Planned Date to Initiate Target Solution</p> <ul style="list-style-type: none"> • Initiated 2013 	<p>Target Date to Retire Legacy System</p> <ul style="list-style-type: none"> • FY 2018 	

APHIS issues a variety of certificates, accreditations, registrations, permits, and other licenses (CARPOL) that ensure the safe movement of regulated agricultural articles into, out of, and through the United States.

Business Needs	Current IT Capabilities	Requirements	IT Benefits and Goals
<p>Single, comprehensive solution to provide CARPOL-related capabilities</p> <p>Support the ACE-ITDS program</p> <p>Improved management of data accuracy, consistency, and shareability</p> <p>Support issuance of permits for importation of live dogs</p> <p>Support capabilities currently provided by ePermits</p>	<p>Provides a PaaS and SaaS cloud environment.</p> <p>Interfaced with USDA eAuth for user access and role management</p> <p>Accessible to APHIS's Cognos business intelligence suite for performing analytics and ad hoc reports</p> <p>Interfaced with pay.gov and eSignLive</p> <p>Data exchanges with ITEMS and ACE-ITDS (via ARM)</p>	<p>User profile management</p> <p>Automatic scaling to meet user load</p> <p>24/7 availability with minimal, if any, downtime</p> <p>Consistent look and feel across the CARPOL components</p> <p>Support for management of reference data and data re-use</p> <p>Support diverse workflows based on commodity and type of CARPOL application</p>	<p>User-friendly interface and ability to keep profiles up-to-date</p> <p>Data that is consistent, reliable, accurate, and shareable</p> <p>Support improved productivity of stakeholders and employees</p>

Challenges

At present, eight automated IT systems⁷ as well as numerous manual processes support APHIS's operational program offices in the fulfillment of its mission to issue authorizations to its stakeholders.

The legacy systems and associated databases have varying levels of documentation – from very complete to minimal and outdated.

Development of the APHIS eFile system has been more complex than initially estimated due to differences among the many work flows, which has limited the extent of reuse of components across the work flows.

⁷ See Appendix 5 for a list of legacy IT systems that support CARPOL activities.

APHIS eFile**Alignment to APHIS IT Strategic Plan**

IT Capability	Alignment
The database will leverage data and data sharing standards	Objectives 2.1, 3.1, 3.4
The system will be hosted on a FedRAMP-certified cloud and will integrate cloud-based solutions such as digital signatures and content management	Objectives 2.1, 2.2, 2.3, 3.3, 4.3, 4.4
Integrate with business intelligence tools and will meet users' needs for automated tools, processing, analysis, and reporting	Objective 3.1, 3.3

The agency's customers will also find improvements through the APHIS eFile solution. It's anticipated that the system will provide applicants with accurate, timely, and consistent guidance concerning laws and regulations affecting their applications, that it will be available 24/7, decrease application processing time, and provide timely receipt and notification of an application.

The APHIS eFile system will support the process of authorizing the movement of regulated articles into (import), out (export), and within (domestic) the United States. The system will support a complex, rules-based process with simple user interfaces. It will be applicant friendly and simplified to reduce complex, duplicate, and unnecessary activities. The burden of determining complex regulatory requirements will be removed from the applicant and managed through business rules incorporated into the technical solution.

Business Needs	Functional and IT Needs	Major Milestones
Provide a standardized tool that enables the public to apply for, check status of application(s), and receive APHIS permits on-line	Hosted on the Salesforce cloud	Implemented live dog module 1st Q FY 2017
Support electronic issuance of permits	Comply with ACE-ITDS data standards for exchange of data with other program systems	Implement additional permit modules 3 rd Q FY 2017
Enable APHIS users and officials in DHS to obtain rapid verification of the authenticity and accuracy of an import permit	Support data exchanges with other applications and systems such as eAuthentication, eSignLive, and pay.gov	

Support data sharing, reuse, and reporting by implementing data standards		
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Strategy

APHIS eFile is being developed and hosted on the Salesforce cloud environment. Shared services of existing IT systems and applications will be leveraged to the greatest extent possible. This includes using USDA's eAuthentication to control user roles and access, pay.gov for collecting payments, eSignLive for digital signatures, and other applications, as needed.

APHIS eFile consists of a set of secure Web-based interfaces which include permit application interface that supports the entry, update, submission, and tracking of APHIS permit applications by the public. It also contains an interface that supports regulatory processing and issuance of permits by APHIS staff.

As a participating agency in ACE-ITDS program, APHIS is required to comply with the program's data and data sharing standards. In order to facilitate this, APHIS eFile is utilizing the ARM system for data exchanges with CBP.

Agriculture Quarantine Activities

- Lines of Business – Global Trade, Population Health Management, Emergency Response, Inspection and Auditing, Analytics
- Hosting – NITC Data Center

Agricultural Quarantine Activity System (AQAS) supports agricultural quarantine activities conducted at US ports of entry by Plant Protection and Quarantine (PPQ) and Customs and Border Protection (CBP). AQAS also supports agriculture quarantine activities conducted inside the United States that are trade-related. The system captures information on agricultural inspections, diagnostic requests, pest identifications, quarantine decisions and regulatory actions. AQAS consists of multiple data entry screens and associated business rules to ensure that captured data meets PPQ data quality standards. The system provides multiple options for data analysis and reporting, and can generate official regulatory documents such as Emergency Action Notification (PPQ Form 523) and Mail Interception Notice (PPQ Form 287). AQAS also supports system interfaces needed for exchanging data with the Agricultural Research Service (ARS) Systemic Entomology Laboratory and the CBP International Trade Data System.

AQAS provides valuable risk information that helps target high risk cargo shipments and passenger arrivals. The system aids in the free flow of agricultural goods into the United States and ultimately helps minimize the impact of quarantine activities on trade. AQAS also provides

mission performance data that aids in making science-based agricultural quarantine decisions that protect US agriculture.

AQAS is comprised of six major components that have been in production since 2003.

System/Component	Description
Emergency Action Notification (EAN)	Supports the regulatory action processes associated with issuance of EANs when actionable violations are required at US ports of entry and domestic sites.
Regulated Import Information System (PPQ280)	PPQ 280 tracks the volume and disposition of regulated agricultural commodities that are imported or transiting through a US port of entry.
Pest Identification Database (Pest ID)	Supports the business processes associated with pest interceptions, pest identifications and quarantine decisions at US ports of entry and domestic sites.
Mail Interception Database (Mail287)	Supports the regulatory action processes associated with issuance of Mail Interception Notifications when prohibited animal or agricultural products are found in incoming international mail.
Agricultural Quarantine Inspection Monitoring (AQIM)	Provides a systematic and statistical-based approach to determining the agricultural risks of foreign cargo or passengers entering the United States.
Work Accomplishment Data System (WADS)	WADS tracks the work activities related to agricultural quarantine activities at US ports of entry, APHIS plant inspection stations, and other domestic sites.

Agricultural Risk Management (ARM) supports operational and analytical needs of Plant Protection and Quarantine (PPQ) and the Department of Homeland Security (DHS) - Customs and Border Protection (CBP) agricultural quarantine inspections (AQI) programs related to commercial cargo. A major goal of this initiative is to develop a system that supports the operational needs of cargo import safety assessments and inspection processes and to maximize such operational efficiency. This supporting tenet shall cut across data collection and follow through with analytical and reporting requirements. An additional aspect of ARM will support the diagnostic and regulatory action needs of Federal and State domestic activities and Smuggling Interdiction and Trade Compliance (SITC) activities focused on mitigating the risks associated with invasive species.

Challenges

Due to the age of the various components of AQAS, completion of ARM as scheduled is critical. However, AQAS has a very diverse set of capabilities used by staff in the field and headquarters as well as by DHS-CBP.

Completion of ARM is dependent on the continued availability of internal program resources to support the complete deployment of the system. The system owner is drafting a plan to request additional staff to support the deployment of the system and continued operational support.

Alignment to APHIS IT Strategic Plan

IT Capability	Alignment
The database will leverage data and data sharing standards	Objectives 2.1, 3.1, 3.4, 4.4
The system will be hosted at NITC and will integrate shared services such as USDA eAuthentication	Objectives 2.1, 2.2, 3.3, 4.3
Integrate with business intelligence tools and will meet users' needs for automated tools, processing, analysis, and reporting	Objective 3.1, 3.3

The ARM application is scheduled to replace AQAS by the 2nd Q FY 2019. The replacement of AQAS will allow the current functionality of six applications to be consolidated into one centralized IT system. The system will also allow electronic transfer of data that will support the operational and analytical needs of APHIS and CBP AQI programs related to commercial cargo, eliminating the need for paper transfer of information. The system will generate data that is more standardized, accurate and readily available giving APHIS insight into operations on a national level because it will provide APHIS with more usable data. The ARM System use secure coding practices and the implementation of multi-factor authentication for access improves the security measures that protects the data contained on the system.

PPQ Cargo Inspection Scenario

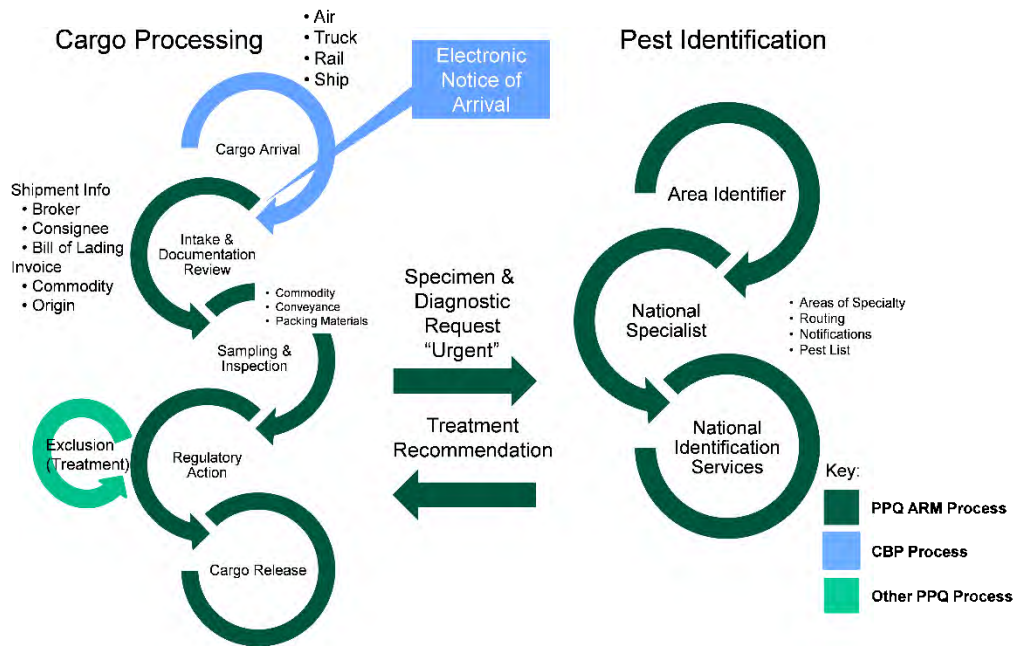


Figure 22. PPQ cargo inspection scenario

Requirements and Schedule

Due to the complexity and diverse capabilities of AQAS, the functionality of the legacy system is being incrementally incorporated into ARM.

Additional program staff will be used to keep the project on schedule for its remainder.

Business Needs	Functional and IT Needs	Major Milestones
Remaining AQAS capabilities	Remaining AQAS functionality	<p>Complete sysadmin and passenger preclearance components 1st Q FY 2017</p> <p>Complete CBP non-cargo integration 1st Q FY 2017</p> <p>Complete CBP mail integration 1st Q FY 2017</p> <p>Complete system development 1st Q FY 2018</p>

Agriculture and Environment Protection

Overview

APHIS Wildlife Services (WS) provides federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist. WS conducts program delivery, research, and other activities through its Regional and State Offices, the National Wildlife Research Center (NWRC) and its Field Stations, as well as through its National Programs.

Business Reference Model 3.1 Alignment		
Population Health Mgmt	Emergency Response	Conservation and Land Mgmt
Legacy Overview <ul style="list-style-type: none"> • Systems –MIS, Blackhawk.net • Program(s) – WS • Platform – Custom • Host Locations – NITC, Mobile • Data Sharing - None 	Challenges <ul style="list-style-type: none"> • Need to automate extensive and diverse set of business capabilities • Extensive community of internal and external stakeholders • Limited documentation on legacy data • Highly distributed, remote national workforce 	
Drivers <ul style="list-style-type: none"> • Implement a flexible, high-performance, on-demand IT solution • Provide high data availability, integrity, accuracy, and reuse • Leverage benefits of FedRAMP commercial cloud providers and shared services • Enhance collaboration across the organization 		Requirements for Success <ul style="list-style-type: none"> • Prepare comprehensive, accurate requirements • SMEs available for testing • Conduct data analysis and modelling • Implement a modular design that supports integration of components across platforms • Provide full system capabilities to users whether or not connected
Targeted Technologies From Roadmap <ul style="list-style-type: none"> • Cloud Services – Salesforce, Esri, document management • Shared Services – eAuthentication, eSignLive, pay.gov • Data Analytics – Trous, Cognos, etc. 		
Planned Date to Initiate Target Solution <ul style="list-style-type: none"> • Planning – 2018, Initiate Project - 2019 		Target Date to Retire Legacy System(s) <ul style="list-style-type: none"> • 4th Qtr FY 2021

The legacy Management Information System (MIS) records efforts to resolve wildlife threats and damage to agricultural products and livestock, private and industrial property, human health and safety, threatened and endangered species, natural resources, and infrastructure.

The MIS enables managers to have access to valuable data in a timely manner. It assists research by enabling operations personnel to gather data that in the past could not be collected. It provides field employees with the capability to generate specialized reports for their cooperators without the assistance of support personnel. It facilitates enhanced information gathering and distribution, internally for decision makers and externally for those requesting information through the appropriate channels.

Challenges

Development of MIS was initiated in 2002 and the system was placed in production in 2005. The database adversely impacts user performance due to an inefficient design.

For users, the system lacks the ability to provide the reporting, data analytics, dynamic charting, GIS data collection, and digital signatures required by operational units.

Target Solution

The legacy MIS will remain in steady state and will be replaced with OARS. OARS will improve the ability of WS to manage its work, perform NEPA monitoring, document work results, cooperate with sponsors and customers, document the Environmental Impact Statement (EIS) decision model and the integrated wildlife damage management strategy, and respond to scrutiny of its operations.

The OARS will provide a standardized infrastructure that is necessary for national uniformity in documentation and analysis of many GPRA goals. The system is the key to quality information management for the many-faceted needs of the WS program.

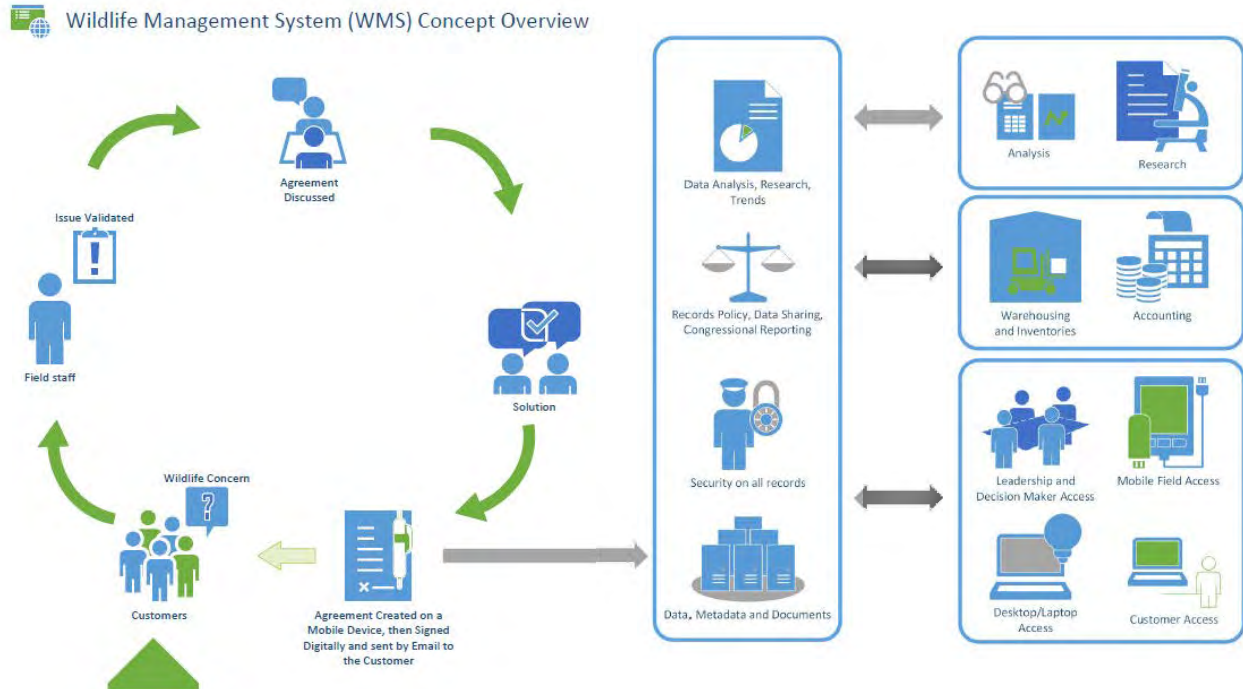


Figure 23. WMS concept overview

Requirements and Schedule

WS initiated planning in the 3rd Q FY 2017. Initial deployment is scheduled for 1st Q FY 2019, followed by quarterly releases for the following two years until all required functionality has been deployed.

Business Needs	Functional and IT Needs	Major Milestones
Realize cost effectiveness	Leverage a shared, cloud-based solution	Complete planning 3 rd Q FY 2018
Improve end-user productivity	Bring data collection to both a mobile platform and automate many steps in the process currently done manually	Complete design 2 nd Q FY 2019
Mobile GPS data collection	Integrate GIS capabilities into the solution	Complete development 2 nd Q FY 2020
Provide electronic signature capability	Optimize the database design for efficiency, performance, and data quality	Initiate implementation 4 th Q FY 2020
Improve data accuracy, reliability, and consistency		Retire legacy system FY 2021
Improve system		

performance and report generation	Enhance overall system security	
Secure mobile and desktop computing environments		

Appendices

Appendix 1: Glossary

- **Business Services:** According to TechTarget, it's "a general term that describes work that supports a business but does not produce a tangible commodity. Information technology ([IT](#)) is an important business service that supports many other business services such as procurement, shipping and finance. A good business service aligns [IT assets](#) with the needs of a company's employees and customers and support business goals..."
- **Conceptual diagram:** Describes the type of interaction between objects
- **Data vs. Information:** Data are stored in a database, spreadsheet, or other format. It lacks meaning when presented on its own. Information is data presented in a form that adds meaning to it.
- **Data dictionary:** defines entities, their attributes (properties), and metadata that comprise the tables and fields (columns) implemented in the databases of systems.
- **Electronic signature (e-signature) vs. digital signature:** According to the Electronic Signatures in Global and National Commerce Act, an e-signature is an "electronic sound, symbol, or process attached to, or associated with, a contract or other record and adopted by a person with the intent to sign a record." A digital signature is the encryption / decryption technology that's used as the basis of an e-signature.
- **Enterprise Architecture:** a strategic information asset base, which defines the mission; the information necessary to perform the mission, the technologies necessary to perform the mission, and the transitional processes for implementing new technologies in response to changing mission needs; and includes a baseline architecture, a target architecture, and a sequencing plan.
- **Enterprise Roadmap:** refers to the document that is produced at least annually by the organization responsible for the enterprise (usually a Federal Agency) and which describes the current and future views of the enterprise-wide architecture, how changes occur, and how the EA program functions.
- **Entity relationship diagram:** Describes the type of data exchanged between objects.
- **Governance:** According to Gartner, it's the specification of decision rights and an accountability framework that includes processes, roles, policies, standards, and metrics that enables an organization to achieve its goals.
- **IT Shared Service:** As defined in *Federal Information Technology Shared Services Strategy (OMB, May 2, 2012)*, an information technology function that is provided for consumption by multiple organizations within or between Federal Agencies.
- **Logical data model:** An abstract structure of a domain of information that shows businesses processes and how the processes relate to one another.
- **Physical data model:** Representation of a data design as it's implemented in a database.

- **Reference table** stores values in tables that are used to constrain data (such as drop-down lists) and validate data (such as zip code). Lists are based on standards established at the national- and international-level.
- **Structured data:** Data that resides in fixed fields within a record or file is *structured data*. Relational databases and spreadsheets are examples of structured data.
- **Unstructured data:** Data that does not reside in fixed locations is *unstructured data*. Unstructured data generally refers to free-form text, which is ubiquitous. Examples are word processing documents, PDF files, email messages, blogs, Web pages, and social sites.

Appendix 2: Acronyms

The following table defines acronyms used in the Roadmap.

AC	Animal Care
APHIS	Animal and Plant Health Inspection Service
ARS	Agricultural Research Service
BPA	Business Process Analysis
BRS	Biotechnology Regulatory Services
CBP	Customs and Border Protection
CIO	Chief Information Officer
DHS	Department of Homeland Security
EA	Enterprise Architecture
FEA	Federal Enterprise Architecture
FITARA	Federal IT Acquisition Reform Act
FS	Forest Service
GIS	Geographic Information System
IITGF	Integrated IT Governance Framework
IT	Information Technology
ITD	Information Technology Division
LOBs	Lines of Business
MRPBS	Marketing and Regulatory Programs Business Services
OIG	Office of Inspector General
OMB	Office of Management and Budget
OS	Operating System (iOS is used by Apple in its mobile devices)
PPQ	Plant Protection and Quarantine

SDLC	System Development Life Cycle
SME	Subject Matter Expert
TRB	Technical Review Board
USDA	United States Department of Agriculture
VDI	Virtual Desktop Infrastructure
VOIP	Voice Over Internet Protocol
VS	Veterinary Services
WS	Wildlife Services

The following table defines acronyms related to APHIS's IT investments and systems.

AQAS	Agricultural Quarantine Activity System
ARM	Agriculture Risk Management
ACIS 3	Animal Care Information System 3.0
ADTIS	Animal Disease Traceability Information System
AzureCloud	APHIS Azure Cloud
ACMS	APHIS Cost Management System
Domino	APHIS Domino
eFile	APHIS eFile
ePermits	APHIS Electronic Permits System
AEI	APHIS Enterprise Infrastructure
APHIS eSignLive	APHIS eSignLive
GIS Cloud	APHIS GIS Cloud System
APHIS ServiceNow	APHIS ServiceNow
BLKHWK	BlackHawk.Net
CTIS	Commodity Treatment Information System (CTIS)

CVB-LSRTIS	CVB Licensing Serial Release and Testing System
PV-Works	CVB Pharmacovigilance
EMRS2	Emergency Management Response Services 2.0
EQS-2	Employee Qualification System
eTrap	eTRAPS
EPI	Exotic Pest Information (EPI) Program
FOSS	Facility Operations Support System
IPHIS	Integrated Plant Health Information System
ITEMS	Investigation Tracking and Enforcement Management System
LMS	Laboratory Messaging Services
Labware	Labware Laboratory Information Management System
LAWGS	Lacey Act Web Governance System
MIS2000	Management Information System 2000
MC	Master Control
NAHRS	National Animal Health Reporting System
NSAR	National Select Agent Registry (NSAR)
NCAH Portal	NCAH Portal
CIPM	NSF Center for Integrated Pest Management
PestLens	Pest Lens
PCIT	Phytosanitary Certificate Issuance and Tracking
PPQ-LIMS	PPQ LIM
PPQ Salesforce	PPQ Salesforce Portal
USDA eSignLive	Project Hosts eSignLive
USDA RAMS	Research Animal Management System
SNICAS	SITC National Information, Communication and Activity System

SpringCM	SpringCM Cloud
SCS	Surveillance Collaboration Services
UFS	User Fee System
VEHCS	Veterinary Export Health Certification System
VSLs	Veterinary Services Laboratory Submissions
VSPS	Veterinary Services Process Streamlining
VSISM	VS Integrated Surveillance Modules
VS-NIES	VS NIES Call Center
VNS	VS NITC System
WIMPS	Warehouse Inventory Management and Procurement System

Appendix 3: APHIS Strategic Goals and Objectives

The following table contains the goals and objectives from the *APHIS Strategic Plan 2015-2019*.

Goal 1: Prevent the entry and spread of agricultural pests and diseases	Objective 1.1: Work with foreign governments and partners to keep damaging pests and diseases from entering the United States
	Objective 1.2: Work with foreign governments and partners to prevent the spread of damaging pests and diseases
Goal 2: Ensure the humane treatment and care of vulnerable covered animals	Objective 2.1: Improve the welfare of animals covered under the Animal Welfare Act
	Objective 2.2: Eliminate soring in the Tennessee walking horse industry
	Objective 2.3: Ensure the safe and humane commercial transport of equines for slaughter
Goal 3: Protect forests, urban landscapes, rangelands and other natural resources, as well as private working lands from harmful pests and diseases	Objective 3.1: Reduce damage to valuable natural and agricultural resources caused by plant pests and diseases
	Objective 3.2: Reduce damage to valuable natural, agricultural, and other resources caused by wildlife
Goal 4: Ensure the safety, purity, and effectiveness of veterinary biologics and protect plant health by optimizing our oversight of	Objective 4.1: Ensure that regulated genetically engineered organisms will not pose plant pest risks when released into the environment
	Objective 4.2: Ensure pure, safe, potent, and effective veterinary biologics are available for diagnosis, prevention, and treatment of animals
Goal 5: Ensure the safe trade of agricultural products, creating export opportunities for U.S. producers	Objective 5.1: Ensure the resolution of sanitary and phytosanitary issues and trade barriers
	Objective 5.2: Eliminate all remaining bovine spongiform encephalopathy (BSE) barriers to export markets
	Objective 5.3: Improve the export customer experience

<p>Goal 6: Protect the health of U.S. agricultural resources, including addressing zoonotic disease issues and incidents, by implementing surveillance, preparedness and response, and control programs</p>	<p>Objective 6.1: Monitor the health, including incidences and issues related to zoonotic diseases, of U.S. agricultural resources</p>
	<p>Objective 6.2: Ensure effective preparedness and response systems</p>
	<p>Objective 6.3: Ensure effective control, eradication, management, and enforcement programs</p>
	<p>Objective 6.4: Manage conflicts caused by wildlife, detect and control wildlife diseases, and protect threatened and endangered species</p>
	<p>Objective 6.5: Provide and coordinate timely diagnostic laboratory support and services</p>
<p>Goal 7: Create an APHIS for the 21st Century that is high-performing, efficient, adaptable, and embraces civil rights</p>	<p>Objective 7.1: Build and maintain a public service-oriented, inclusive, high-performing workforce by investing in and engaging employees</p>
	<p>Objective 7.2: Build a safe, secure, and efficient workplace by leveraging technology and shared solutions across organizational boundaries</p>
	<p>Objective 7.3: Value the differences offered by a diverse workforce, and leverage those differences to better serve the Agency's customers</p>
	<p>Objective 7.4: Maximize the return on taxpayer investment in APHIS through stewardship of resources and focused program evaluations</p>

Appendix 4: APHIS Portfolio of Information Technology Investments and Systems

APHIS maintains a portfolio of IT investments aligned to business functions. These investments provide funding to IT projects that develop, enhance, and/or maintain automated IT systems used daily by the agency's business units and stakeholders.

Current information on the portfolio is available on the APHIS EA SharePoint site. On the left-side panel, select from the list of available EA inventories.

AEI Components

AEI is the General Support System (GSS) for APHIS and provides the technology for APHIS's business processes, programs, and applications. AEI provides all core computing capabilities for APHIS. AEI provides a robust, stable, secure infrastructure that APHIS uses for all computing needs.

AEI has seventeen components:

- Server Operating Systems (2008, 2012, and Red Hat Linux)
- Workstation Operating Systems (Windows 7, 8.1, 10 and MacOSX)
- Workstation Hardware (Dell, HP)
- Firewalls (Cisco ASA)
- Network Telecom (Cisco Routers, Cisco Switches)
- Web Servers (WebSphere, Apache, IIS)
- Databases (Oracle, SQL)
- Applications (eWorks, SharePoint)
- Vulnerability Scanners (Foundstone)
- Anti-virus (Forefront)
- VPN (Cisco)
- Voice over Internet Protocol (VoIP) (Cisco)
- Video Conferencing (Tanberg, Cisco)
- Virtual Servers (VMware, Hyper-V)
- Mobile devices (iOS 10.2.1)

Consolidated and Retired IT Investments and Systems in 2017

IT System or Component	Replaced By	Program	Enabling Technology
EQS	EQS 2	EMSSD	Salesforce PaaS Environment

Scheduled Migration, Replacement, and Consolidation of IT Systems and Components

IT System or Component	To-Be Replaced By	Program	Target Year	Enabling Technology
Numerous disparate GIS applications	APHIS GIS System	APHIS-wide	Initiated - 2017	Esri Cloud Environment
MIS	MIS 2	WS	Planning - 2017	Cloud PaaS, Esri, eSignLive
AQAS	ARM	PPQ	2018	Modernization Initiative
Domino Platform	Varies	APHIS-wide	2018	APHIS replaced one application with a Salesforce app and another is being replaced through the use of an application shared by the Forest Service
MetaStorm	Varies	APHIS-wide	2018	APHIS maintains a limited number of applications on the MetaStorm platform. Business capabilities provided by these are being transitioned to other platforms.

Appendix 5: Legacy IT systems providing CARPOL capabilities

The following legacy IT systems currently provide automated capabilities related to the permits and licensing business areas. The APHIS eFile system, hosted on Salesforce, is being developed as the target application to provide the automated capabilities as APHIS continues to transition to cloud-based services.

Name	System Acronym	CARPOL Function	APHIS Program	Description
ePermits and Fruit and Vegetable Import Requirements (FAVIR)	ePermits and FAVIR	Permitting	PPQ VS BRS	A comprehensive electronic permit data collection and management system that tracks all activities associated with APHIS permit processes. Enables movement of a regulated article into, from, or within the United States. Entities use ePermits to apply for a permit, pay permit application fees, check the status of a permit application, and view issued permits and other information online in a secure manner.
ACIS	ACIS 3	Registration License	AC	Collects and manages customer data for license, registration, and facility research. Used for inspections, data collection, data analysis, data management, monitoring, and reporting to ensure compliance with the Animal Welfare Act (AWA) and the Horse Protection Act (HPA).
Commodity Treatment Information System ⁸	CTIS	Certification	PPQ	A distributed web-based system for storing, tracking, and reporting data collected from quarantine treatments and related conveyances, and regulatory information targeted to particular quarantine treatment types. The system is owned by and hosted at North Carolina State University.
Licensing, Serial Release, and Testing Information System	LSRTIS	Licensing	VS	Manages establishment, product license, serial release, and testing information that is used to facilitate decisions relating to new product licensing, serial release, inspection, and compliance of veterinary biologics firms.
Phytosanitary Certificate Issuance and Tracking System/Veterinary Export Health Certificate System	PCIT and VEHCS	Certification	PPQ VS	A web-based system for the online application and issuance of plant and plant product export certificates for U.S. plants and plant products being exported to foreign countries. PCIT tracks the inspection of agricultural products and certifies compliance with plant health standards of importing countries. Provides better security, reporting functions, and monitoring capabilities for exported commodities. Applicants can pay for their certificates through an interface to Treasury's Pay.Gov. Provides training to Federal, State, and County Authorized Certification Officials (ACOs) through interface with USDA eAuthentication. (VEHCS module provides core functionality to automate the creation, endorsement, payment, and printing of Veterinary Export Health Certificates.)

⁸ IT system is owned and hosted by North Carolina State University (NCSU) and is accessible to APHIS through a cooperative agreement with NCSU.

Name	System Acronym	CARPOL Function	APHIS Program	Description
Phytosanitary Export Database	PExD	Certification	PPQ	A repository of foreign country phytosanitary import requirements for U.S.-origin commodities. PExD supports the task of entering export summaries for foreign countries. Provides reusable text to facilitate uniform entry of export summaries. PExD also provides PPQ, State and County cooperators, and industry user's easy access to export summaries via direct user queries. PExD interfaces with the PCIT application processing to provide pertinent export summaries based on the importing country, article, and other data contained in PExD.
Veterinary Services Process Streamlining	VSPS	Certification	VS	A multi-purpose system with six modules that provide an electronic means for monitoring, capturing, maintaining, and analyzing information associated with the international, interstate, and intrastate movements of regulated animals and animal products. The system also contains important elements used in the Veterinary Accreditation Program for information management.

NOTE: Systems may change as additional information is acquired regarding functionality.

Appendix 6: IT Investments Funding Cooperative Agreements

The following IT investments fund cooperative agreements with the North Carolina State University, which owns and hosts the listed IT system:

IT Investment	IT System	Program	Business Domain
Commodity Treatment Information System (CTIS)	CTIS, including	PPQ	Global Trade
Exotic Pest Information Program (EPIP)	Exotic Pest Information Program	PPQ	Population Health Management
Offshore Pest Information Program (OPIP)	PestLens	PPQ	Emergency Response

Appendix 7: Geospatial Applications

The following lists existing and planned geospatial applications that have been identified to be migrated to the Esri cloud environment.

Application or Component Name	Program	Planned or Existing	Description of Business Needs Met by Application
Chesapeake Bay Nutria Eradication Project	WS	Existing	Ability to have multiple viewers and editors of the CBNEP database as well as collect data digitally with QC/QA measures in place.
Field Applications and Surveillance	WS	Planned	Provide the ability to collect, analyze and distribute field data and information that is necessary for Program operations including monitoring and evaluation.
Spatial Wildlife Damage Management	WS	Planned	Provide a secure environment to host and serve program data to a distributed workforce within Wildlife Services. In addition provide a platform that will support real time or near real time data collection, monitoring, and evaluation.
Spatial NFSDM	WS	Partial	Provide a secure environment to host and serve program data to a distributed workforce within Wildlife Services. In addition provide a platform that will support real time or near real time data collection, monitoring, and evaluation.
Spatial Airport Wildlife Hazard Management	WS	Partial	Provide a secure environment to host and serve program data to a distributed workforce within Wildlife Services. In addition provide a platform that will support real time or near real time data collection, monitoring, and evaluation.
Spatial Wildlife Research	WS	Planned	Provide a secure environment to host, share, and collect species occurrence data.
Wildlife Services Flights	WS	Planned	Provide a secure environment to host, share, and collect Areal Wildlife missions.
Asian Gypsy Moth Delimitation Surveys	PPQ	Existing	With Collector, surveyors are able to navigate to predetermined sites to set traps. Data is synchronized each evening, providing managers with an updated view of activities the following morning.

Grasshopper / Morman Cricket Survey	PPQ	Planned	The present system uses paper and pencil to collect Grasshopper data. Surveyor will use Collector to collect data and synchronize to AGOL. Potential to replace ArcPAD for the entire Grasshopper program.
Historic Barberry Eradication Database	PPQ	Partial	Provide a secure and centralized environment to host, share, and query a historic database to inform current day surveillance.
Predictive models and associated surveillance design delivery	PPQ	Planned	Provide a secure and centralized environment to host, share, and query predictive risk models and associated data for survey support and resource allocation.
Comprehensive and Integrated Surveillance including Program reporting, Commodity Disease Surveillance, Emerging Diseases Framework, National List of Reportable Animal Diseases. Animal movement reporting. Self-service mapping for situational awareness.	VS	Partial	Current needs met are monthly, quarterly, or annual program status on email or posted to websites. Future needs are to support dynamic mapping capabilities.
National Preparedness and Incident Coordination	VS	Partial	Current needs met are daily and weekly static mapping for National Incident Coordination Group, VS Incident Management Team, VS Trade Team, and state responders. Future needs are to support dynamic mapping capabilities.
Scientific computing, advanced analytics, and studies	VS	Partial	Current needs are met through desktop computing. Future needs are to support dynamic mapping capabilities.

Appendix 8: References

APHIS

TMACO FY 17 and Beyond Roadmap

APHIS Enterprise Cloud Strategy, 2016

APHIS Mobile Computing Strategic Plan

APHIS Network Connectivity Roadmap

APHIS FY 2015-2019 IT Strategic Plan

APHIS FY 2015-2019 Strategic Plan

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25-Point Implementation Plan to Reform Federal Information Technology Management, OMB, December 9, 2010

