APRIL 5, 2022

CDFA TECHNOLOGY ROADMAP

OFFICE OF INFORMATION TECHNOLOGY SERVICES

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Version History

Version	Date	Description
1.0	3/24/2022	1st Published Version

1. Introduction

The CDFA Technology Roadmap was created to establish a framework for future information technology (IT) investments within CDFA[1]. The goal for the Roadmap is to ensure there's alignment between CDFA's Strategic Plan and the division/program's needs, the Office of Information Technology Services (OITS) direction and ability to provide solutions, and California State policies and direction.

The CDFA Technology Roadmap aligns with CDFA's vision, goals, objectives, and approach while incorporating information technology (IT) solutions to solve CDFA's business problems and leverage opportunities to achieve the Departments' Strategic Plan Goals and Objectives. A key foundation of the Technology Roadmap is the knowledge gained by the CDFA Enterprise Architecture Office in the development of the CDFA Business Capabilities Model (BCM), which identifies the business capabilities, or functions, performed by every division within CDFA. This knowledge provides significant information on how investments could be made to achieve the broadest CDFA-wide benefits and lay the foundation to achieve the Strategic Plan Goals and Objectives. In addition, the Technology Roadmap is guided by the statewide policies, direction, and best practices, driven and supported by various control agencies. The most significant, and impactful, of the statewide policies are those involving information security and application development and hosting, which directly guide CDFA's Technology Roadmap.

One additional important note, CDFA is tightly aligned and utilizes the resources of the counties, County Agricultural Commissioners and Sealers Association, and others that are not statutorily a part of CDFA. However, these organizations are critical for CDFA to carry out the CDFA vision, goals, and objectives, and provides the external leadership and resources to do that. While this CDFA Technology Roadmap does not include their separate IT solutions and needs, the intent of this Roadmap is to include the reporting and all other IT relationships CDFA has with these entities; if CDFA requires the information to be delivered, a solution is within scope of this Roadmap.

2. Overview

While many Technology Roadmaps identify a cascade or sequence of detailed solutions that should be implemented, one-after-another, to achieve a goal, the CDFA Technology Roadmap defines the goals, objectives, constraints, and an approach for making technology investment decisions, considering all CDFA's needs and available resources. By understanding the organizational vision, goals, objectives, and constraints, the identification of an approach is more of a decision-making process rather than a pre-defined and detailed sequence of solution steps that should be

[1] Reference to "CFDA" implies applicability to all divisions within the California Department of Food and Agriculture, unless a specific division (or divisions) are identified.

implemented. The only exceptions to this are Information Security and some infrastructure items, which provide the technology foundation necessary to build upon.

The primary reason for the CDFA Technology Roadmap taking this process-oriented and decision-making approach is to:

- Define what technology investments should be pursued, primarily guided by the funding processes and constraints applicable to CDFA
- Advisory Boards and other stakeholders have a significant role in funding IT changes
- The Food and Agriculture Code imposes funding limitations that impact IT investments, *and*
- Other CDFA unique limitations, to include personnel resource constraints faced Department-wide.

As stated above, often, Technology Roadmaps commonly identify a sequence of technology investments the department needs to make, and departments plan, either through internal budget set-aside, redirection, or through Budget Change Proposals (BCPs), the funding to acquire, implement, and support the technology. For CDFA, primarily funded by the Food and Agriculture Special Fund and Federal funds, this approach is not realistic, and obtaining General Funds for exclusive Food and Agriculture industry and government use has not been successful, frequently met with resistance by control entities.

Therefore, this Technology Roadmap establishes the big-picture goals and objectives for technology investments by CDFA to ensure there is alignment with the CDFA Strategic Plan to aid in the selection of technology solutions as resources, funding, and staff, come available. As one can expect, there are well-defined and significant constraints on any technology solution implementation that must be considered; these constraints arise from state policies, funding, resources for long-term maintenance and support, and numerous other sources.

3. CDFA Strategic Goals and Objectives

CDFA's Strategic Plan (current version is 2019-2022) touches every Division, Branch, Program, and employee; it serves as the compass of the organization, an actionable plan to keep the organization focused to reach its goals and objectives. With clear and concise performance measures defined, it serves as the driving force behind the development of this Technology Roadmap.

The strategic plan of CDFA, *Figure 1: CDFA Strategic Plan Goals and Objectives (complete text contained in Appendix 1 – CDFA Strategic Plan Goals and Objectives*), defines the long-term direction of the enterprise, articulating what the enterprise intends to do to achieve its mission. Review of Goals and Objectives clearly identifies an environment where there are opportunities to:

- Promote and protect the diverse local and global marketability of California grown food

- Maximize resources through collaboration, innovation and improve processes
- Educate and engage rural and urban communities through educational programs
- Improve regulatory efficiency via., overlapping inefficiencies *and*
- Invest in employee development through training and, knowledge sharing

To achieve the Strategic Plan Goals and Objectives, CDFA must look at the data that the Department collects as its biggest asset and look to control/master it across all Programs to reap the maximum benefit. Only data can provide an objective view of the current state, and the information generated from the data can assist and guide CDFA into making informed decisions to achieve the Goals and Objectives.

Enterprise technology governance and data management are key to delivering business value, eliminate silos, address operational inefficiencies, and ensure consistent and comparable data exists. The use of trusted, secure, accurate, and consistent data is key to best serve the citizens of California and the California agricultural industry, i.e., achieve CDFA's mission.

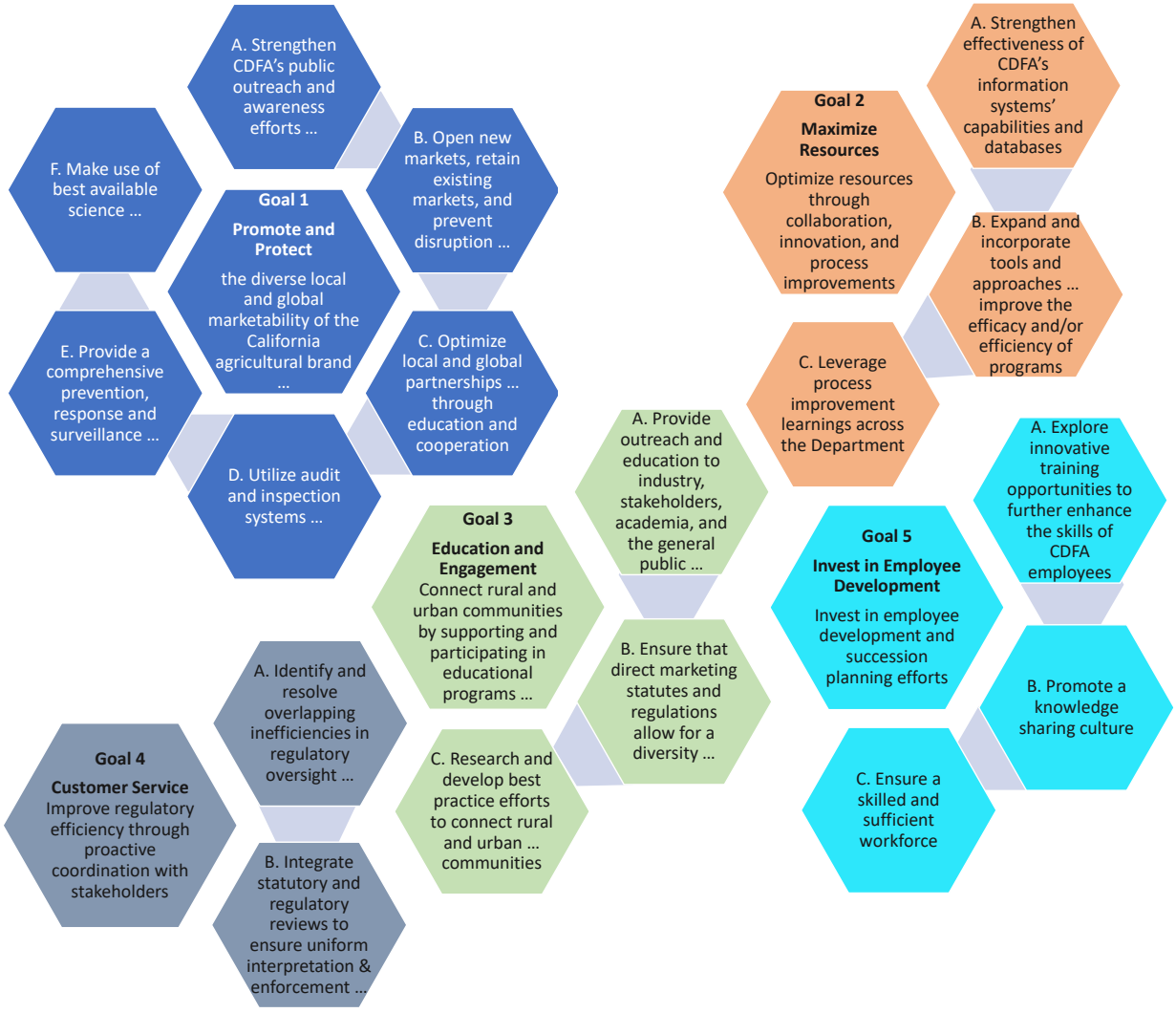

Figure 1: CDFA Strategic Plan Goals and Objectives

Within each of the CDFA Goals and Objectives, and across them, there are significant opportunities for the organization to guide IT investments to achieve broad, CDFA-wide, solutions if the solutions were considered in context of the overall Department Goals and Objective, not siloed by an individual program. While it is clearly recognized that solutions depend on funding and funding is parceled out by individual programs, there does exist an opportunity to achieve the larger CDFA Goals and Objectives with a wiser program and/or organizational investment in IT solutions, and in the eventual selection of enterprise-wide IT solutions.

4. Technology Roadmap Objective

The objective of this Technology Roadmap is to provide a big-picture view of the existing and desired IT environment within CDFA and to define a process, or methodology, where the selection of IT solutions will enable individual program investments and aid in achieving the Department's broader goals and objectives, within the constraints that are imposed on CDFA. More specifically:

1. Identify the existing IT environment within CDFA, as the existing environment is not what would be considered as the "ideal" state to aid in achieving CDFA's Strategic Plan Goals and Objectives.
2. Ascertain and define a vision for a future state, where CDFA needs to better position the Department to achieve the Strategic Plan Goals and Objectives.
3. Recognize the issues and constraints that the Department faces, that will both help and deter the ability to achieve the desired future state.
4. Identify CDFA Organizational changes that could be made to assist the Department in planning and making wiser investments in IT solutions and how the processes can be altered yet live and thrive within the defined constraints.

5. Current State of CDFA Technology

The following identifies the current state of CDFA's Technology environment and lays the foundation for defining the Technology Roadmap for the Department. Within this section, additional details are described to "set-the-stage" by defining where CDFA is currently at with respect to technology and the factors or barriers that impede progress of existing IT assets to assist in achieving the CDFA Strategic Goals and Objectives.

It's important to note that the current state was defined and built over the past 20+ years based on a practice of unique siloed custom development of applications and building the infrastructure to support those applications. While there are multiple reasons for this past practice, the result has created significant technical debt[2] for CDFA. Most significantly, the past practices created a roadblock in attempting to achieve the defined CDFA Strategic Goals and Objectives. As identified above, the CDFA Strategic Goals and Objectives is heavily dependent on the ability to share and look-across the

[2] "Technical debt", in this context, is related to the extensive amount of custom coding that has been created by CDFA, ~7 million lines of code developed, compared to the resources available to maintain that code to ensure it remains secure and supportable; there is a true cost to having excessive technical debt.

organizations' data and create information in relation to CDFAs constituents, stakeholders, customers, diversity, outcomes, etc. With the current state of siloed data, this outcome is not possible and creates a major impasse for CDFA to move forward.

5.1 Business Capabilities and Applications

CDFA division business capabilities and the applications that support the division programs and staff in the execution of the functions necessary to perform the business capabilities are tightly linked. In the past, and current state, each division's business capabilities have been achieved by relatively small, siloed applications, which has resulted in a significant technical debt for CDFA and extremely limited sharing of data. Currently, CDFA has implemented ~350 small custom-built applications and ~100 commercial-off-the-shelf (COTS) and software-as-a-service (SaaS) applications.

The CDFA Enterprise Architecture Office (EAO) performed a detailed review, with support from the Divisions, and identified the business capabilities for CDFA's Divisions, and more broadly across all CDFA. The output of the EAO effort is the CDFA Business Capabilities Model, which illustrates the magnitude of siloed business capabilities, functions, spread across CDFA. Many, if not most, of these siloed business capabilities consist of one or more individual IT systems/applications that have been developed over the past 20 + years and are currently in production operations to support the business.

The following, Figure 2: Current State Example, is a summarized version of the Business Capabilities Model that looks across CDFA and illustrates the major business functions, shown as blocks, for each Division and Office. Again, for each block shown in Figure 2, there are one or more unique siloed IT systems for each Division to carry out the identified business capability functions, even if the business capability is similar in different divisions. Illustrated at the bottom of this figure are the individual siloed databases used by the applications. These databases contain data that is used by the applications and the data is not shared or distributed across applications or databases, nor is it necessarily compatible or consistent. This type of architecture presents significant challenges for CDFA in advancing the CDFA Strategic Goals and Objectives, which is heavily dependent on looking at data across the organization, something not achievable with the current state.

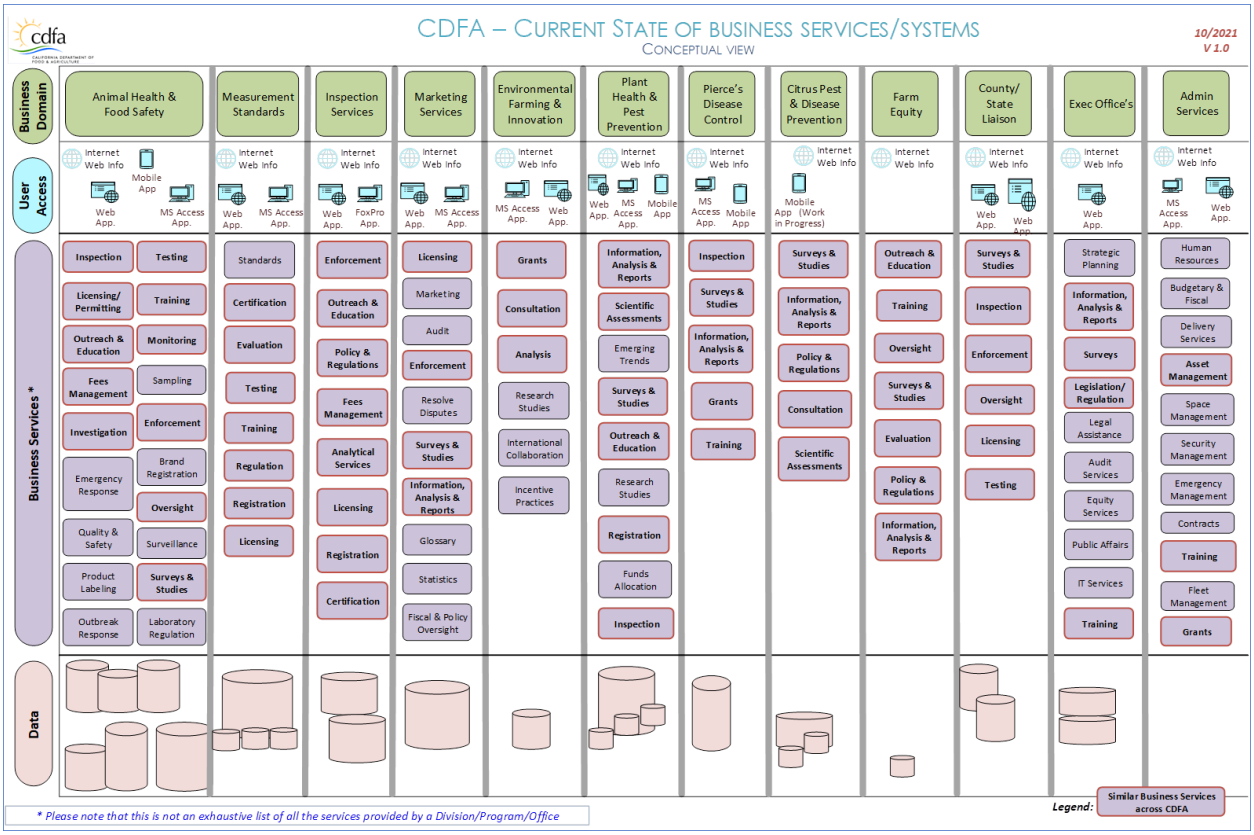

Figure 2: Current State Example

For the ~350 custom applications, these applications were built using technologies that are currently out of date, not supported by the creators of the programming technologies used, have significant security flaws, and unsupportable long-term by CDFA. Virtually no maintenance[3] has been performed on the applications since they were initially created, which exposes CDFA to a significant and potentially wide-spread risk if, for example, an unsecure application is exploited by a bad-actor and corrupts CDFA data, interjects ransomware into the CDFA environment, or gains access to other statewide resources in other departments through existing CDFA interfaces.

For the ~100 COTS applications, many divisions use COTS applications instead of custom developed applications to meet their business needs, though these applications were still implemented as a siloed solution, unique to a program. COTS solutions offer significant advantage over custom solution, especially when it comes to functional changes and maintenance. Generally, the level of effort to make functional changes in a COTS system is significantly less than making similar changes in a custom developed solution, and the risk associated with "breaking" existing functionality is lower. In addition, the maintenance of COTS solutions is simpler and requires less effort due to the manufacturer of the COTS product creating the maintaining updates and CDFA staff

[3] Note, "maintenance" is NOT the implementation of functional changes and/or enhanced functionality, "maintenance" includes maintaining existing functionality yet upgrading the underlying technologies to be industry supported, OITS supportable, and address non-functional issues, such as security, performance, stability, etc.

simply need to apply the maintenance update. While generally simpler, for CDFA, most of the COTS products are out-of-date, using versions that are no longer supported by the manufacturer, since they have moved on to newer versions, and the level of effort needed to update the COTS applications now, after they have fallen multiple versions behind, is significant.

5.2 Data Management

Organizations survive, and prosper, on the data that they collect and the ability to transform that data into information to make well-informed strategic and tactical decisions. The data collected, the quality of that data, and the ability to retrieve and transform the data, is paramount to generate meaningful information. To ensure organizational data is meaningful, transformed into necessary information, and is properly controlled, organizations establish Data Governance and Data Management functions, which typically govern data at the enterprise level to reap benefits like better services to customers, reduce redundancies, and enable better decision making. At its simplest, Data Governance is concerned with the policies, processes, and procedures around data, while Data Management is concerned with the execution of the policies, practices, and procedures to make the data collected meaningful for decision making.

CDFA, as an organization, currently lacks Data Governance and Data Management functions. While some divisions may have formed a “Data Governance” team, the activities being performed are not consistent with Data Governance definition, standards, or objectives. Additionally, as seen in the Business Capabilities Model, there is a significant amount of data that is likely common data that would benefit from a CDFA Data Governance function. Similarly, a Data Management function would ensure the data collected would comply with data standards, enhance the quality of the data, and make the data and resulting information consistent and shareable across CDFA. Currently, the sharing of data and information across programs within a division and across divisions would be problematic as the data is not consistent due to the lack of data standards, even for common data elements such as names, addresses, geo-coordinates, etc. Therefore, the sharing of meaningful information will also be problematic.

5.3 Infrastructure Services

Infrastructure Services covers those critical technology components and systems that most CDFA users never see yet are critical for them to perform their daily job. These include items such as physical equipment (servers, storage arrays, firewalls, network routers and switches, cabling, power supplies, equipment chassis and racks, etc.), system software (Windows Server, SQL Servers, Virtual Machine Software, etc.), and services (User Authentications, network address translation services, etc.). All of these, individually, are critical to the daily operations for CDFA and directly support the ability to perform the business capabilities and functions of the programs, divisions, and CDFA.

Over the last 2-3 years, CDFA has made significant progress on improving the CDFA infrastructure and services, especially compared to the decade or more prior. Key to

the improvements made was Executive Office support for a BCP, Budget Year 19/20, to move the legacy CDFA data center from the 1220 N Street site to the State Gold Camp data center. While this BCP provided the funding to move the data center and acquire new equipment, more importantly, the approved BCP provided the ability to rebuild the legacy infrastructure architecture, which was hindering long-term improvements, and created a new architecture that will support CDFA well into the future.

While significant infrastructure improvements were made, the new world with enhanced telework, the need for increased access to more data for remote workers, as well as controlling costs, all still need to be addressed. As an example, CDFA primarily uses expensive physical on-premises storage for files and data; with a continued increase in the need to scan and store more and more data for remote access, this approach cannot be supported at a reasonable cost. Additionally, some infrastructure components and services have not yet been upgraded or replaced, such as our ability to back-up data for a longer period, more than 30-days. And, as security threats continue to change and evolve, and infrastructure being a primary target for these threats, the infrastructure will continually need to evolve to meet the threat.

5.4 Information Security

Over the past couple of years, CDFA has made a significant improvement in our information security capabilities and posture. From a resources perspective, the CDFA Information Security Office has grown from one (1) position to four (4) positions during this period, through a necessary re-direction of existing positions. Additionally, improved information security tools have been purchased and implemented department-wide, such as CrowdStrike, Intune, etc. However, with these improvements, there has been only a minor impact in reducing the overall vulnerability of CDFA. Due to our relationships with other State entities, we have not helped reduce the information security vulnerability of the State.

Currently, CDFA has a significant number of information security deficiencies, as documented in State Information Security Audits and Assessments findings conducted by the Department of Technology and the California Military Department. The high number and severity of these findings has characterized CDFA as a highly elevated information security risk for the State. While the CDFA Information Security Office has successfully addressed and resolved some of the identified findings, many unresolved findings require a greater commitment of resources and/or funding than what's available. CDFA has submitted a BCP to fund consultant services, for short-term staff augmentation, and to acquire the products and installation services to address identified high and medium criticality information security findings.

5.5 IT Staffing, Training, and Tools

While IT Staffing, Training, and Tools may not be viewed the same as applications, data, infrastructure, and security, this area is critical to the Technology Roadmap and necessary to drive the Roadmap and to implement and support technology solutions to achieve the CDFA Strategic Goals and Objectives. Additionally, all "systems" consist of three main components: technology, processes, and people. The latter, as it relates to

developing, operating, and maintaining technology systems, is why this section is included in the Technology Roadmap. The Technology Roadmap is not achievable without people, who are trained, and have the tools necessary to support the vision.

5.5.1 Staffing

As identified in various Executive Governance meetings and other forums, OITS continues to have a relatively high vacancy rate. While OITS has 68 authorized positions, there has been a steady multi-year 20-30% vacancy rate. As shown in Figure 33, below, the OITS Sections with the largest vacancy rates are the Portfolio and Project Management Office (PPMO) and the Applications Development and Support Services (ADSS) Section.

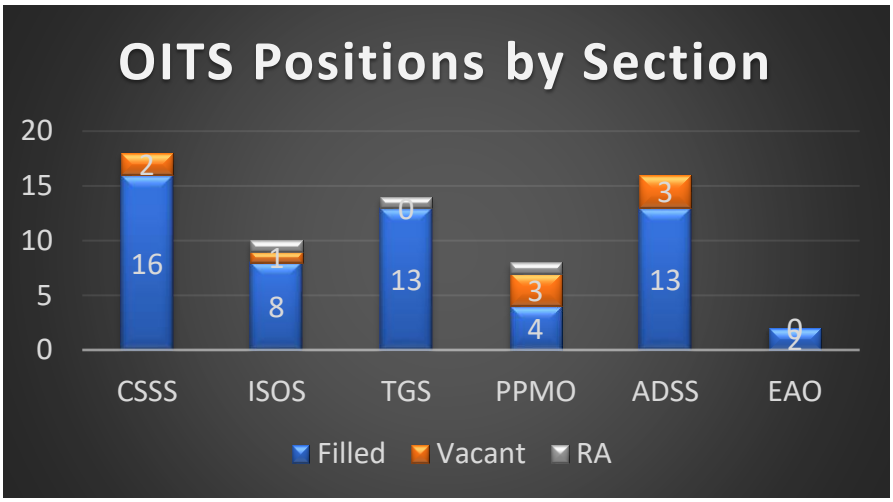

Figure 3: OITS Staffing by Section

The current OITS staffing model is built on the prioritized need to maintain and support current operational technology solutions, i.e., the current business needs of all CDFA. The model prioritizes “keep-the-lights-on” work with less emphasis, and lower priority, on new technology solutions. Hence, the OITS Sections that have staff that are involved in “keep-the-lights-on” work are mostly staffed, while the PPMO and ADSS, which are more involved in developing new technology solutions, are intentionally left with the highest vacancy rate.

Additionally, OITS uses a high number of staff augmentation consultants, ~16, from a variety of contracts. Some of the consultants have unique skills in specific software solutions and are dedicated to a specific program until the work is completed, while others are more generalist and shared across multiple programs and divisions. All consultants charge their time to specific programs and those programs are invoiced monthly for the consultant time worked. While the use of these consultants is vital for both “keep-the-lights-on” work as well as the implementation of small projects, the resulting effects when consultants leave is the loss of corporate knowledge, with remaining State staff held responsible to maintain and support a solution they know nothing about.

5.5.2 Training

As technology continues to change at a rapid rate, staying current with main-stream technology, not leading edge, is imperative for an organization to succeed. Within CDFA, the primary technologies that are currently used to support the business functions are mostly older technologies, becoming unused in industry and therefore no longer supported by the manufacturer of the technology; these technologies are quickly becoming difficult for OITS to support.

To provide training, OITS procured an online training service that provides training on generally accepted industry technologies, such as Microsoft products, Adobe products, and a few others. This training service fulfills the training needs of many of the staff that perform day-to-day "keep-the-lights-on" functions, such as Service Desk support, imaging of computers, and others.

However, for non-mainstream technologies, such as many of CDFA's COTS and SaaS applications, no training is available through the online training service. This type of training is unique to the COTS/SaaS manufacturer and only available through the manufacturer. OITS has not provided any of this type of training to the staff supporting these applications for over 5-years. While OITS staff are being held accountable to maintain and support these applications, OITS has not been able to invest in their training to realistically hold the staff accountable.

5.5.3 Tools

Since the beginning of the COVID-19 Pandemic, OITS has invested in providing the tools necessary to support remote work capabilities for the IT staff. These tools allow CDFA IT staff to remotely access CDFA users' computer, troubleshoot, and fix problems that are being encountered. These tools are primarily used by the Service Desk and Telecommunications staff and currently meet the existing needs.

For other functions performed by OITS, there is a significant lack of tools to support the work they perform. For Application Development, COTS/SaaS support, Business Analysis, Testing, and Project Management, the work performed is complex, with hundreds of activities and tasks being planned for different people and groups at different times, yet the work is being planned and tracked manually with minimal tooling support to aid in reducing the complexity.

5.6 Current State vs CDFA Strategic Goals and Objectives

The current state of technology within CDFA is a major constraint, and roadblock, to achieve the CDFA Strategic Goals and Objectives. For most areas of technology, CDFA is operating siloed, unsupported, and unsecure technology that is mostly beyond its expected lifespan. As shown in Figure 2: Current State Example, data exists in siloed solutions that cannot be efficiently shared across the organization, which impacts CDFA's ability to create the information necessary to support and achieve the CDFA Strategic Goals and Objectives.

Many goals within the CDFA Strategic Plan require enhanced communications, collaboration, establishing partnerships, proactive communications, and other related functions that are severely limited by the current state of technology and data silos. The only existing enterprise applications and services that CDFA uses are generic capabilities, such as Microsoft Office 365 solutions of Teams, SharePoint Online, OneDrive, etc. While these generic capabilities can be made to work in a more dynamic and open environment, they are limited and not well suited to build upon to achieve the CDFA Strategic Goals and Objectives.

6. Future State of CDFA Technology

The future state of technology is highly challenging due to the organizational composition, the siloed model of programs within CDFA, funding challenges and constraints, and numerous other factors. However, there are opportunities that will arise, unexpected or unplanned influx of funding, urgent Executive and Legislative Branch support for a program or initiative, etc. If more strategic considerations and decisions were made, CDFA could leap ahead significantly in achieving the overall CDFA Strategic Plan Goals and Objectives which will push the CDFA Technology Roadmap forward.

The future state of CDFA technology is also heavily driven by State statutes and related policies, interpreted direction from control agencies, evolving State Information Security requirements, as well as by the procurement direction provided by the Department of General Services and State Technology Procurement Division. For most Executive Branch organizations, these drivers significantly limit, constrain, or can potentially support what departments need. This Technology Roadmap is focused on adhering to statute, policies, and gaining both financial and support from the control agencies and procurement organizations to help CDFA achieve its Strategic Goals and Objectives, and to better serve the food and agriculture industry, constituents, and communities, regardless of any diversity status or their ability to connect to CDFA.

The future state is driven by eliminating the siloed applications and its supporting infrastructure and consolidating data to be an enterprise asset, not an individual program asset. Concurrently, the individual program needs must be addressed as well as those of the stakeholders. This is achievable using existing enterprise applications, as it is being done in many other State departments today.

6.1 Business Capabilities and Applications

One of the most significant results of the CDFA Enterprise Architecture Office's work in developing the Business Capabilities Model was the identification and grouping of common business functions and capabilities across the Department. The CDFA Common Business Functions view, Figure 44, represents the greatest opportunity for the Department to develop common modern technology solutions that will benefit all programs that perform these functions, reduce the Departments technical debt, lower IT costs, build the technology future for CDFA that can respond quickly to emerging needs, and lay the foundation for achieving the CDFA Strategic Goals and Objectives. For the 22 common business functions listed, CDFA currently has ~75-100 unique siloed

solutions, each with their own data that's inconsistent across solutions, preventing CDFA from knowing answers to simple questions, such as who are the people CDFA licenses?

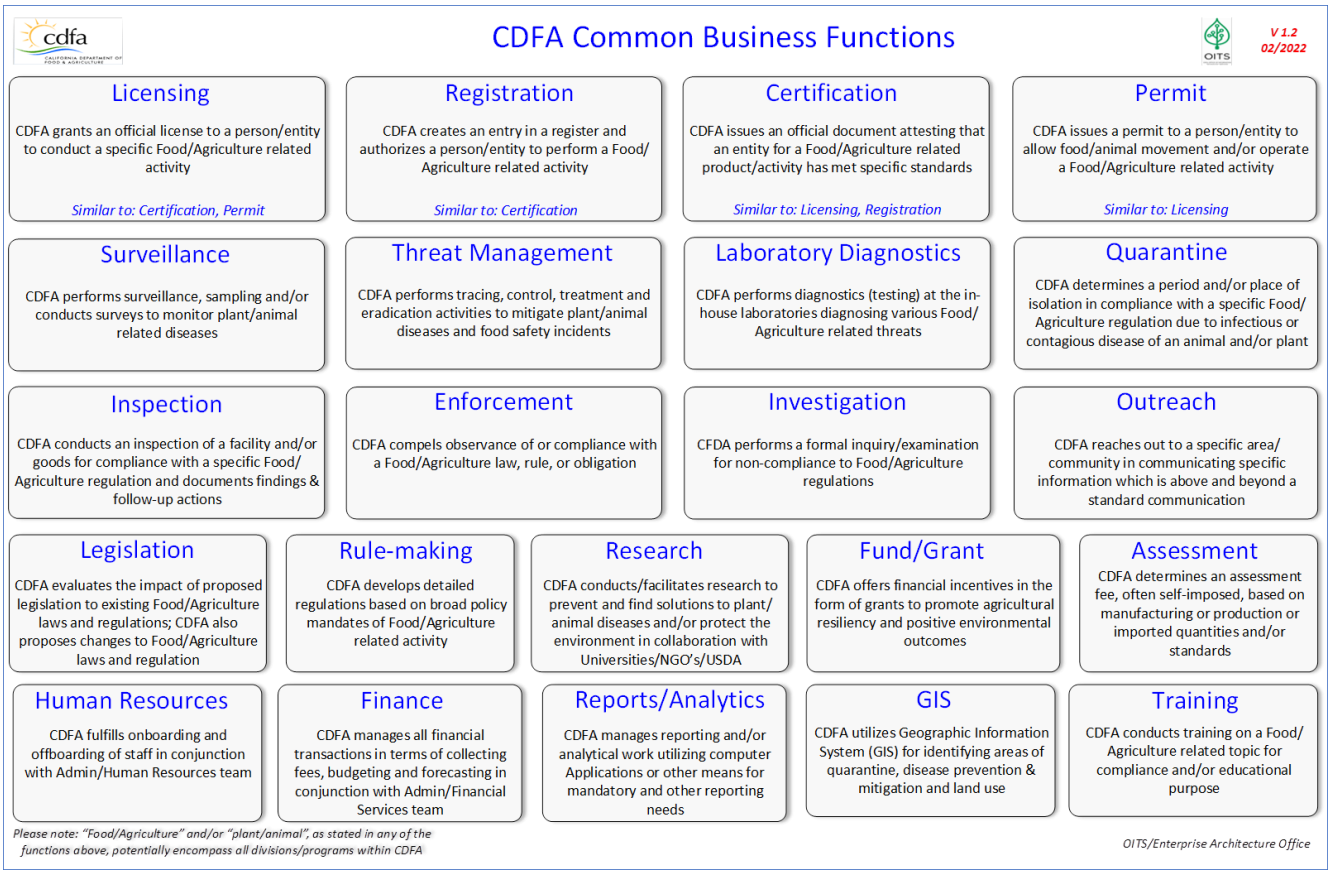

Figure 4: CDFA Common Business Functions

For the Department to move forward, the default practice of developing small siloed custom solutions needs to cease; CDFA must move forward with solutions that are more flexible, robust, secure, and configurable enterprise-wide solutions that can be leveraged to implement the functional needs of most, if not all, of these common functions, as well as the needs of other less-common functions. These enterprise solutions exist today and are widely used by many other State entities as well as by CDFAs peers in the Federal government, e.g., USDA.

Many wonder what is meant by an "enterprise solution". A definition from Gartner: "Enterprise solutions are designed to integrate multiple facets of a company's business through the interchange of information from various business process areas and related databases. These solutions enable companies to retrieve and disseminate mission-critical data throughout the organization, providing managers with real-time operating information." When this definition is viewed with consideration of CDFA's Strategic Plan, there are numerous identified goals and objectives that could significantly benefit by using an enterprise solution.

Some additional benefits that can be derived by an organization moving to an Enterprise Solution include: “boost efficiency with scalability and agility”, “Improve security and reduce risk”, “Optimize IT costs”, ”Innovate faster”. “Create an agile and strategic workforce”, etc.[4]

For CDFA, to achieve the CDFA Strategic Plan Goals and Objectives, moving to an enterprise solution is essential; the Goals and Objectives cannot be achieved by using siloed, data segregated, solutions as the Plan requires information be generated by looking at the data across all CDFA programs, which cannot be done today.

6.2 Data Management

In reviewing the CDFA Strategic Plan Goals and Objectives, the only way for many of these to be achieved is through across-program collaboration through the sharing of data and information that is fed through a collection and by the secure use of individual program data. As stated previously, data is not synonymous with information, data is what is collected via data fields on forms, inspection reports, enforcement actions, list servers, public requests, or calls, etc. Information is how that data is used and the intelligence it provides, such as through the generation of reports, risk-based inspections assignments, public outreach, awareness, and education campaigns, etc.

When looking at the CDFA Strategic Goals, like Promote and Protect, Maximize Resources, Education and Engagement, and Customer Service, it’s difficult to achieve the Goals, and sub-goals, when the Department is using ~350-450 siloed solutions, where data is completely segregated and inconsistent, and information sharing is only through printed reports or verbal interpretations. This type of sharing is very static, not dynamic, and information is often lacking in context and inconsistent between programs. However, the sharing of data and information by using an enterprise solution is significantly enhanced, more real time visibility, and can be controlled based on the security requirements of the underlying data.

However, a significant issue arises that must be considered by the Department, though one that has been faced and overcome by many State and Federal entities, which is that of Data Governance and Data Management. As stated previously, CDFA does not do either in accordance with any best practice or standard and the current approach would not be sufficient for enterprise solutions. In conjunction with the CDFA Enterprise Architecture Office to assist, CDFA must move forward with establishing an Enterprise Data Governance and Data Management practice as a strategic initiative.

6.3 Infrastructure Services

The Technology Roadmap for Infrastructure Services is to continue to migrate infrastructure services off premise and into the cloud. By moving services, such as file storage, into the cloud, CDFA can realize significant cost savings. For storage specifically, more and more programs are considering digitizing their paper documents and store them electronically, which aids and supports the increased telework

[4] Deloitte Consulting, a top five (5) integrator of enterprise solutions, per the Gartner Magic Quadrant.

capabilities for the Department. On premise storage is extremely expensive, with a service life of 4-5 years, and requires more overhead in IT resources to manage. However, it's envisioned that CDFA will use a hybrid model, having limited on premise storage with a growing off premise storage capability.

Besides storage, there are numerous other infrastructure components that should be moved into the cloud, such as our extensive array of virtual machine platforms, which should be moved to cloud platforms, such as service offerings by CDT, Amazon Web Services (AWS), Google Cloud, Microsoft Azure Cloud, etc. The use of these services is currently being investigated with pilot efforts being planned to better understand the capabilities, benefits, and drawbacks of each. Another critical, high-priority, area for cloud adoption is backup and recovery for CDFAs systems and data, to include features such as ransomware protections; besides ensuring CDFAs operational capabilities, the absence of these capabilities within CDFAs infrastructure are information security deficiencies per the SAM 5300 requirements.

CDFA will be moving in this direction, as it's consistent with State policies and direction, and to gain support from the various control agencies. Additionally, this direction will provide lower costs, more flexibility, higher security, and make better use of the limited IT resources available to support the infrastructure.

6.4 Information Security

The Technology Roadmap for Information Security focuses on increased automation using off premise tools and support, such as the expansion of the State Security Operations Center capabilities and new CDT Security as a Service offerings. Both offer significant benefits by using shared services, well trained and dedicated staff to support and monitor the security tools, quick statewide notification and response, as well as support from control agencies.

The State Security Operations Center became a direct General Fund organization in the Fiscal Year 21/22 budget cycle and is no longer charging departments for their costs. Additionally, the Security Operations Center has received significant additional funding, through approved BCPs, and has expanded their capabilities and offerings to departments, at no cost. CDFA needs to leverage the Security Operations Center as the cost of Information Security tools is high, and the training of capable staff to manage, monitor, and respond to security incidents is generally beyond the capabilities of small and medium size organizations.

Additionally, the CDT Office of Technology Services (OTech) has begun, and continues to expand, their Information Security offerings. These for-cost offerings, when coupled with the no-cost State Security Operations Center, offer a comprehensive Information Security umbrella that are tightly coupled, integrated, and better positioned to respond to emerging threats. Additionally, they provide trained and dedicated resources to ensure their services are operational, being monitored, and respond to threats real-time, something that CDFA cannot do.

The CDFA Information Security Office will be focused on those tasks that cannot be outsourced to OTech or the Security Operations Center, which are primarily focused on the people and organizational aspects of Information Security, such as security policies, training, continued migration of high-risk business applications to more secure enterprise solutions, etc. These are activities and tasks that cannot be outsourced and rightly belong to a team within CDFA that know the internal people, culture, and challenges faced by CDFA's statewide business operations.

6.5 IT Staffing, Training, and Tools

With the Technology Roadmap, or vision, defined above, there will need to be a shift within IT staffing, training, and tools that moves staff away from low-level hands-on customization, coding, creating environments, maintaining databases, etc. towards configuring, monitoring, and interacting with the service providers. While there may be some staff who prefer the low-level hands-on type of work, organizationally, and with the constraints placed upon CDFA, past practices need to change and evolve, as many other governmental entities are doing or have already completed this transition.

6.5.1 Staffing

When moving towards enterprise solutions, and away from custom solutions, the staffing levels and their knowledge need to keep pace with the transition. There will be a shift in many areas of IT, moving away from the low-level hands-on work towards communicating and coordinating with service providers, performing configuration-type work, rather than coding, and generally understanding how to manage COTS and SaaS solutions, contracts, and the vendors who provide those solution. While still IT, this is a shift towards more contract management and knowledge of the vendor proprietary applications, e.g., knowing how to configure them and understanding the capabilities.

This transition will impact our Infrastructure and Application Development sections the most and both personnel assignments and training needs must be considered. The COTS/SaaS Office will need to expand while the Applications Development Unit, for custom software, will need to be reduced, meaning workload will need to be re-distributed based on the solution-type.

6.5.2 Training

As stated above, training for COTS/SaaS solutions, which generally fall under the broad taxonomy of enterprise solutions, are generally only available through the manufacturer of the specific products or services. Therefore, as the transition begins towards enterprise solutions, IT training must be accounted for and provided. This type of training is an investment in all CDFA as the applications will no longer be siloed to a specific business program but common across multiple CDFA programs. The same training will enable the IT staff to support the broader user based, be more proficient, and expand and adapt the enterprise solution to solve problems or needs quicker than possible with custom solutions.

Training will also need to include more non-traditional IT training, such as vendor and contract management, training on contract terms and conditions and service level

agreements (SLAs), CDFA policies and procedures regarding contract administrations, etc. These topics are not the traditional IT training topics and for some staff, this will be difficult to embrace and learn, potentially leading to some staff turnover. However, this type of training is necessary for CDFA to manage enterprise solutions.

6.5.3 Tools

Tools for the future will be heavily dependent of the enterprise solution and must be accounted for when selecting the solution. Most enterprise solutions in use by various State departments already include the necessary tools to administer, configure, maintain, and support the solutions. However, additional solutions and tools will be necessary as a single solution may not meet all CDFAs needs. Additional solutions will include interface, or application program interfaces, that will be needed to bridge the gap between an enterprise solution and legacy applications while CDFA makes this transition. Additionally, the project management and related tools will become more significant as multiple projects will be implemented concurrently within a common solution, making coordination more imperative.

Additional tools will likely be needed to enable the generation of CDFA-wide reports, such as Business Intelligence and advanced data analytics tools, that can be used by both IT staff and more skilled business program analyst. The needs can be predicted, but the exact tool suite will need to evolve as the enterprise solution is determined and implemented.

6.6 Future State vs CDFA Strategic Goals and Objectives

The necessary future state of CDFA to achieve the defined CDFA Strategic Goals and Objectives is dependent on the ability to create common platforms with a consistent and comprehensive master data repository. As illustrated in Figure 5: Future State of Business Services/Systems, common applications must be leveraged and built using a common, or small set of common, enterprise solutions that relies on a single master data repository. While this figure shows potential solutions focused on the Common Business Functions shown in Figure 4, these solutions will likely collapse into a smaller subset of more powerful enterprise solutions, where one enterprise solution can meet the needs of multiple common business functions, as well as less common functions.

To address the needs of individual programs, modern enterprise solutions partition functionality, to include data, so that the applications appear as virtual siloed solutions. While these virtual siloed solutions appear as if they are unique to the program, they utilize a common enterprise application and common master data store. This approach is comparable to when a user accesses the Microsoft office.com Web site to view their email, calendar, Team sites, etc. This is a common enterprise application that behaves as a unique application for each user, only displaying their information, the configuration changes/views that the user established, their contacts or favorites, etc., though the actual application is one common application across all users. Similarly, enterprise applications that implement business functionality behave in a similar manner, each instance of business functionality behaves as a program exclusive application, with the

programs unique data fields, workflows, dashboards, routing information, etc. However, underneath it is a common application and a master data repository.

Embedded in Figure 5 is “Information, Analysis & Reports”. Most enterprise solutions provide extensive reporting capabilities, to generate information out of the data, but to report across all CDFA, additional reporting capabilities may be required. To protect the confidentiality of program data yet provide information to aid CDFA in planning to achieve the Strategic Goals and Objectives, the broad reporting ability must be controlled, and narrower reporting capabilities, such as across a Division, is achievable, as well as other granular slicing of the enterprise data.

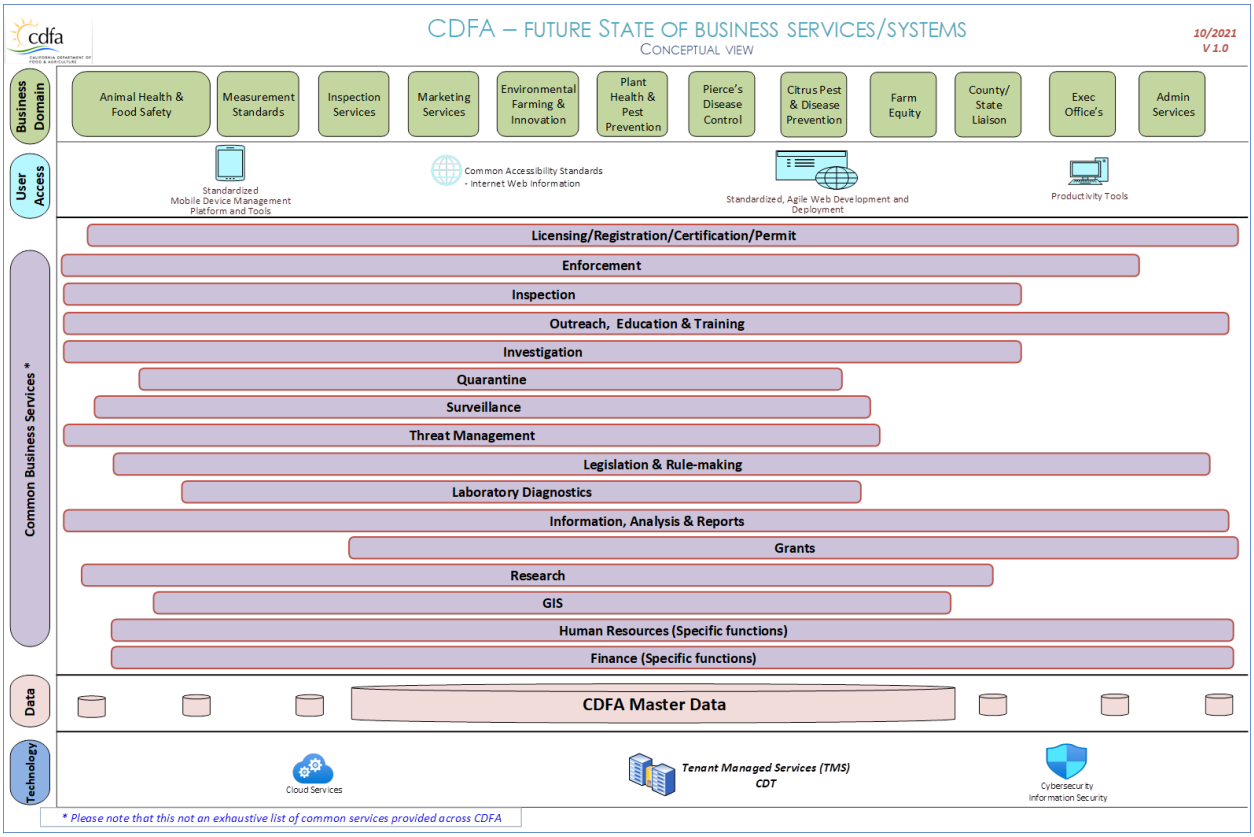

Figure 5: Future State of Business Services/Systems

7. Roadmap Constraints

There are a significant number of internal and external constraints that will impede CDFA in achieving the future Technology Roadmap, though they can be overcome with diligent and thoughtful management, planning, and coordination. While everyone within State service has a defined role to play, we all have a common and unified mission to serve the citizens of California. By leveraging that commonality, and demonstrating diligent and thoughtful management, planning, and coordination, many if not all the constraints can be eliminated or reduced to negotiable levels.

Some of the clearly identifiable internal constraints include, but not limited to:

- Funding, funding within CDFA is very granular to individual programs and often controlled by industry Advisory Boards and/or funding from Federal programs with specific guidelines and chartered to focus on a single or narrow agricultural industry, communities, or other target area, not across the entire California agricultural domain.
- Cross-Program Communication/Coordination, past CDFA cultural practices has siloed many programs to communicate and coordinate only within their respective Division and/or Branch.
- Resources, many programs within CDFA are resource-constrained due to the method of funding positions, balancing industry costs versus government services.
- Skills/Training, as noted in the CDFA Strategic Plan, CDFA needs to invest in improving the skills of employees; without this investment, achieving the Strategic Goals and Objectives in all other areas will be hampered, as well as achieving the future technology state.

Some of the clearly identifiable external constraints include, but not limited to:

- Statutes, more specifically the Food and Agriculture Codes (F&AC) and Business and Professions Codes (BPC), which put significant constraints on CDFA that impact everything from resources, funding, program control, etc.
- State Policies, which include those defined in the State Administrative Manual, Statewide Information Management Manual, State Contracting Manual, etc., these all impact the process of achieving the future technology state.
- Control Agency Resources, turn-over/transitions within Control Agencies impact CDFAs ability to promote roadmap agenda items within the context of the F&AC as well as the long-term vision for technology modernization.

8. Roadmap Achievement Approach

The following describes a high-level approach to providing more enterprise focus on IT initiatives to drive towards achieving the CDFA Strategic Plan Goals and Objectives and the future Technology Roadmap. Listed here are conceptual ideas that need to be worked through the existing CDFA Enterprise Governance Committee to develop a final implementation plan to create more governance over the IT direction within CDFA.

- Establish an IT Governance Committee that reviews all future IT initiatives and advocates for common enterprise solutions or determine if a unique/siloed solution is necessary
    a. The CDFA Strategic Plan Goals and Objectives should aid in this decision-making
    b. The CDFA Business Capability Model, and more specifically the Common Business Functions, must be leveraged
    c. All proposed IT needs, including BCP proposals with IT components, must flow through this Committee, so Committee communications must be robust and flexible, such as through voting email and video calls

   d. Committee must advocate for additional one-time and/or bridge funding for enterprise solutions that will be implemented gradually, to later become self-sufficient
- Establish and charter and Enterprise Data Governance and Data Management function within CDFA that is charged with defining the data policies, standards, and implementing those to ensure data across programs/applications can be shared and result in the generation of meaningful information
- CDFA IT initiatives must attempt to leverage common enterprise solutions to lower overall costs, reduce technical debt and resource requirements, and allow for potential future expansion for emerging business needs
- Utilize outside services where feasible, such as infrastructure and security services by adopting Cloud First mentality, as required by State policy.

9. Notional/Conceptual Timeline

Below, Figure 6, is a high-level notional/conceptual timeline for the Technology Roadmap transition. A key point illustrated in this timeline is that CDFA has begun the Technology Roadmap transition with the implementation of an Enterprise Grant Portal and is currently identifying an Enterprise List Server[5] solution.

Another point is that a Common Enterprise Application Solution needs to be identified and the migration of legacy applications and the use of this solution for emerging business needs will continue over a period of multiple years. Additionally, as part of a Governor's Office initiative, CDFA has initiated research into an Enterprise Licensing and Payment Portal, which will likely use this Common Enterprise Application Solution.

As this transition occurs, the data within the master database will grow and the use of siloed databases will diminish, though some will always be needed to support unique business needs. Through this progression, the use of Cloud Provided Services for infrastructure and security will expand, consistent with the use of enterprise applications and services, and In-House Provided Services will diminish.

[5] Currently, CDFA uses multiple siloed List Servers with their own siloed data on stakeholders and their interests, which is contrary to the needs to achieve the Strategic Plan Goals and Objectives.

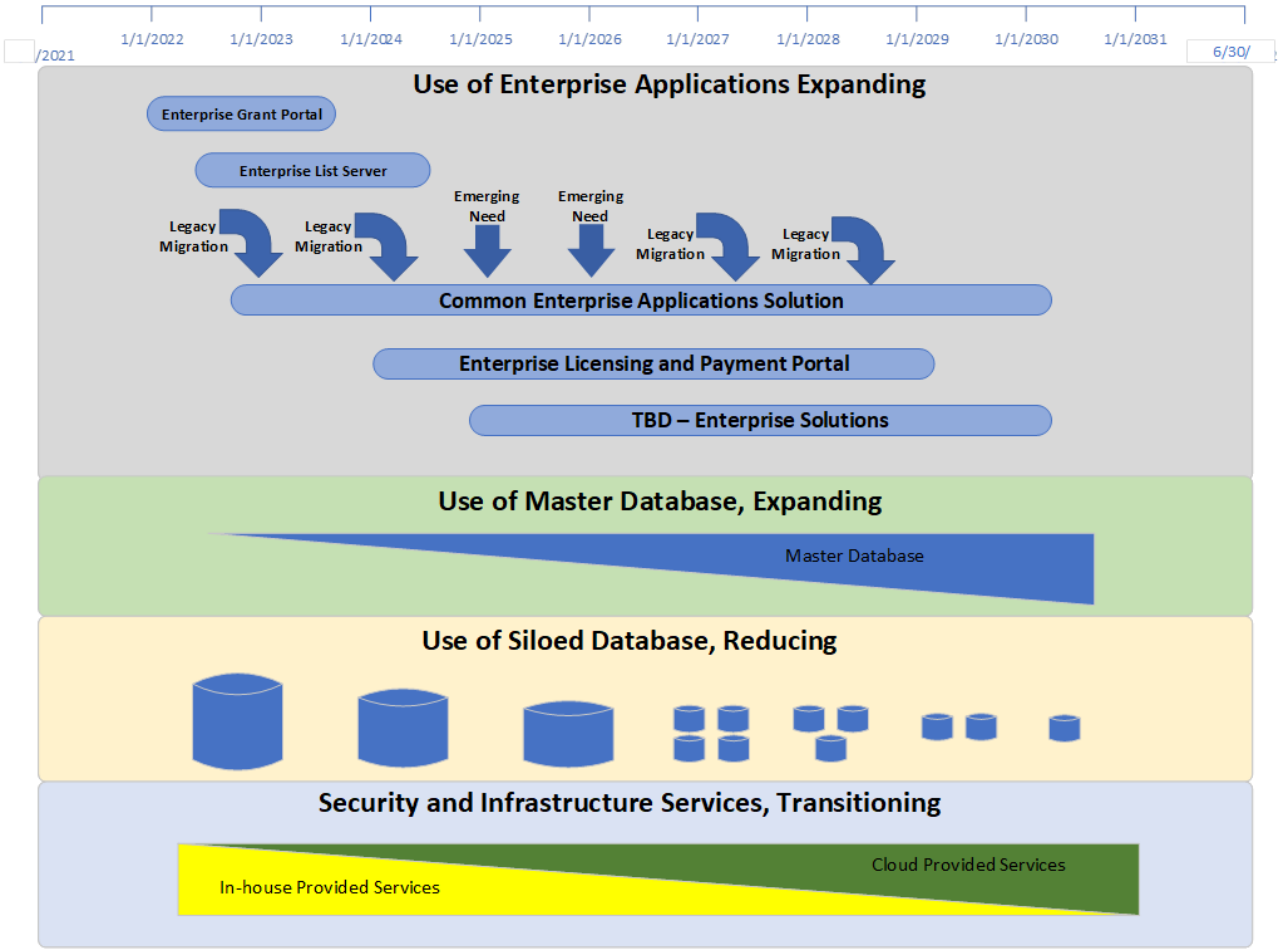

Figure 6: Conceptual Timeline

Appendix 1 – CDFA Strategic Plan Goals and Objectives

The following are a complete description of the CDFA Strategic Plan Goals and Objectives as identified in the current version of the Plan.

1. **Promote and Protect** – Promote and protect the diverse local and global marketability of the California agricultural brand which represents superior quality, value, and safety.
    A. Strengthen CDFA's public outreach and awareness efforts for programs and activities that assist in the creation of new and the promotion of existing markets.
    B. Open new markets, retain existing markets, and prevent disruption through data collection.
    C. Optimize local and global partnerships to promote California projects through education and cooperation.
    D. Utilize audit and inspection systems to facilitate marketability and prevent market disruptions.
    E. Provide a comprehensive prevention, response and surveillance system of adverse events that protects the agricultural, natural, and water conveyance resources.
    F. Make use of best available science in the development of policies, statutes, and regulations.
2. **Maximize Resources** – Optimize resources through collaboration, innovation, and process improvements.
    A. Strengthen effectiveness of CDFA's information systems' capabilities and databases.
    B. Expand and incorporate tools and approaches which improve the efficacy and/or efficiency of programs.
    C. Leverage process improvement learnings across the Department.
3. **Education and Engagement** – Connect rural and urban communities by supporting and participating in educational programs that emphasize a mutual appreciation of the value of diverse food and agricultural production systems.
    A. Provide outreach and education to industry, stakeholders, academia, and the general public to discuss issues, build partnerships, and take action.
    B. Ensure that direct marketing statutes and regulations allow for a diversity of access opportunities.
    C. Research and develop best practice efforts to connect rural and urban agricultural communities.
4. **Customer Service** – Improve regulatory efficiency through proactive coordination with stakeholders.
    A. Identify and resolve overlapping inefficiencies in regulatory oversight by CDFA and other state agencies.
    B. Integrate statutory and regulatory reviews to ensure uniform interpretation and enforcement within the Department.
5. **Invest in Employee Development** – Invest in employee development and succession planning efforts.

A. Explore innovative training opportunities to further enhance the skills of CDFA employees.
B. Promote a knowledge sharing culture.
C. Ensure a skilled and sufficient workforce.