

Five-Year IT Roadmap



Department of Public Health & Environment

Aligning business goals and technology forecasts
July 2019



COLORADO
Governor's Office of
Information Technology
Serving people serving Colorado

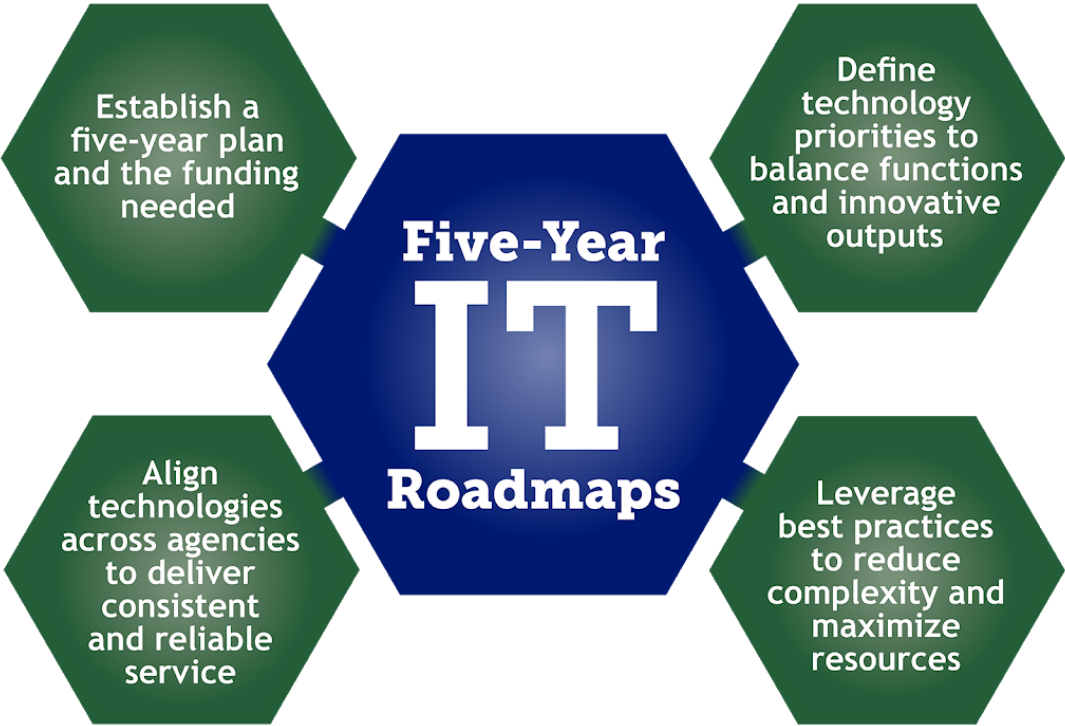
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Introduction

The Governor’s Office of Information Technology (OIT) works in partnership with our customers to create a Five-Year IT Roadmap for each agency we serve. OIT has four primary goals that guide our technology planning to help state agencies receive the most from their technology and related services.

Technology Planning Goals



Assumptions

Agency and enterprise initiatives, timelines and costs within this document operate under the following assumptions.

Environment

- Decisions related to major agency initiatives or projects may alter this plan.
- Infrastructure and security will be maintained to meet state and federal compliance.
- OIT is a cloud-first advocate and, therefore, will look to cloud solutioning for all new service needs. OIT will also seek cloud service capabilities for legacy applications/workloads requiring refresh before targeting on-premise utilizations.
- As it relates to this document, the term “enterprise” is used to define high-impact, IT services utilized by multiple OIT customers.

Drivers of Cost and Complexity

- Costs are estimates that are based on an initial quote, vendor information or past initiatives and are subject to change.
- It is estimated that overall IT costs will increase by no less than 3% per year.
- Cost allocation for Decision Items are based on OIT’s current Common Policy rates.

Assumed Constants

- Staffing is assumed to remain constant.
- Hardware refresh cycles are assumed to be executed on a four-year lifecycle for desktop computers and a three-year lifecycle for laptops.
- Approximately 20% of the state IT infrastructure is refreshed annually with the intent of completing a full infrastructure refresh every five years. Budget constraints may impact this cycle.

Changes to Roadmap

- This is a living document which will be updated once per year; dependencies, timelines, and cost estimates are subject to change.

Agency Business Objectives

Maximizing technology resources requires that agency business objectives drive technology investments. The objectives below have been identified by the Colorado Department of Public Health & Environment and submitted to the Governor's Office of State Planning and Budgeting (OSPB) to reflect the agency's current top strategic IT priorities. OIT works with the agency to provide the best solutions to support each objective.

Objective 1

Improve Air Quality

Objective 2

Reduce Suicide Deaths

Objective 3

Increase Immunization Rates

Objective 4

Increase Healthy Weight (Healthy Eating/Active Living or HEAL)

Objective 5

Reduce Opioid Misuse

Objective 6

Emergency Preparedness and Response

Objective 7

High Performing Organization Sub Items

- Digital and process transformation
- Climate Friendly Workplace Includes change the culture from tolerating remote work to encouraging it.
- Health Equity and Environmental Justice

Achieving many of the objectives above will require connecting various data sets from a number of state agencies and other sources. In some cases for the first time and in others just more quickly/ more real-time than in the past.

The objectives above reflect where CDPHE is in their current five year planning effort and are subject to change a bit as CDPHE's strategic planning process is ongoing until June 2019.

Agency Initiative Roadmap

The graph below shows where agency and enterprise objectives fit into the overall five-year roadmap and plan for scheduled completion. The graph contains three sections. The first presents mission critical technology debt which are either agency or enterprise initiatives that are vital to the functioning of government services. The second section presents new solutions which are requested by the agency or initiatives that OIT has identified as a gap in services or solutions, and the third section presents future innovations which are proposed as solutions that will increase state employee efficiency and improve service to Colorado residents and state visitors.

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Mission Critical Technology Debt	Air Pollution Systems Modernization	[Green Bar]				
	Building Access System - LSD			[Green Bar]		
	Central Cancer Registry System	[Green Bar]				
	Decommission Applications		[Green Bar]			
	Electronic Birth Systems Rewrite	[Green Bar]				
	Electronic Health Records (EHR)	[Green Bar]				
	Environmental Records Management	[Green Bar]				
	Health Facilities System Rewrite Phases I and II	[Green Bar]				

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Health Information Exchange (HIE)					
Legacy Accounting System Stabilization					
Microsoft Access Database Application Risk Mitigation					
Microsoft Sharepoint Online Upgrade					
Network Cabling Upgrades					
Newborn Hearing Screening					
Newborn Metabolic Screening LIMS					
OS Server Upgrades					
Performance Evaluation Planning (PEPS) Upgrade and HRWorks Future Phase					
Separation of Duties between CDPHE and OIT Initiative					
Survey Research Call Center Manager					
Windows 10 Upgrade					

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New Solutions	Backup Data Center Connectivity and CDPHE Presence					
	Business Intelligence					
	Colorado Environmental Online System (CEOS)					
	Data Integration Platform					
	DocuSign					
	Enabling CDPHE Remote Workforce					
	HR Application Migrations					
	Water Quality Control Division - Application Modernization					

Agency Initiative Details

Mission-Critical Technology Debt

These initiatives are vital to the functioning of normal government services. Delay in pursuing the initiatives will create a need for future effort and resources that surpass the resources needed if the initiative were carried out proactively.

Air Pollution Systems Modernization

The data systems that support many of the programs in the Air Pollution Control Division will reach the end of life in the next five years. Working with OIT, the department is developing a modernization plan for these systems. This plan will include the updating of some components and the migration of other components to new systems. The modernization of applications within the Air Pollution Control Division will provide a clearer picture of air quality within Colorado. The application modernization effort will update and many different existing software and manual (paper) applications into a scalable data system. This effort will produce internal and external efficiencies through improved automation and data flows. One example of an internal efficiency will be the use of web- and mobile-enabled interfaces for the collection, storage and exchange of critical sample and inspection data. Modernization will move the division to a more flexible and scalable data environment. This initiative is funded and the timeline is FY20-23.

Building Access Systems - Laboratory Services Division

In 2019, the Laboratory Services Division is upgrading their Symmetry Building access system to a newer version of the same system. OIT has some concerns about the maturity and supportability of the Symmetry system, even after the upgrade. OIT recommends the upgrade as a short term solution with a long term suggestion to move onto a different system platform. The initiative is unfunded and the timeline is for FY22 or later.

Central Cancer Registry System

The current cancer data system used by the Colorado Central Cancer Registry has been in place since the early 1980s. While updates have been made over time to the user interface and functionality, the underlying architecture is antiquated and is not adaptive to current innovations in communicating with electronic health and laboratory records. A new system is needed to provide support for all core cancer registry functions including importing data, editing, linkage, consolidation, reporting, and interoperability with health systems. The current system is on a Windows 2008 Server which will not be supported after December 2019.

Estimated first-year costs of a new cancer data system are \$405,000, with subsequent years' maintenance costs of \$55,000 annually. Colorado's general fund currently supports annual maintenance fees of the current system, which are approximately \$36,000 annually. It is anticipated that the first-year purchase and data migration fees will be covered by a combination of sources, which may include a request for general funds. Subsequent yearly maintenance fees are expected to be covered by a requested small increase in general funds for CCCR. Procurement and implementation are expected to occur in FY20-21. This initiative is unfunded and the timeline is FY20-21.

Decommission Applications

At CDPHE, there are 19 applications in APMS recommended for decommissioning. There are 53 others recommended for consolidation, re-platforming or replacement. This will result in the requirement for Enterprise Applications to process decommission plans and obtain agency approval to remove data and decommission servers. This will also require change order level work for other teams like Deskside Support Services (DSS) to remove software installed on PCs to support these applications and database and server teams to archive and turn off systems. This effort may be tied to the funding/resource ask that CDPHE submits as part of the Separation of Duties initiative mentioned later in this plan. This initiative is unfunded and the timeline is FY21-24.

Electronic Birth Systems Rewrite

The current electronic birth system contract expires in April 2020, and the system will need a refresh. CDPHE received \$2.4 million in spending authority for FY19 to complete an upgrade project between late FY18 and early FY20. Currently, hospital staff enter birth certificate information directly into the electronic birth system; they would like the new system to interface with hospital electronic health records to minimize the amount of manual data entry. An RFP to solicit a vendor to build the new system will be released in late FY19. For reference: this application is called Colorado Vital Information System (COVIS). This initiative is funded and the timeline is FY20-21.

Electronic Health Records (EHR)

Implement a fully-integrated Electronic Health Records (EHR) system across local public health agencies. Many local public health agencies do not have any electronic health record capabilities. This project will not only allow EHR capabilities but will integrate those systems with a Health Information Exchange so that public health data can be shared with state, local, and federal agencies for public health purposes. CDPHE began the project several years ago and is about to finish implementing the first phase which was funded through FY19. CDPHE submitted a Decision Item for FY20 for \$500,000 to support maintenance costs in FY20. CDPHE plans to submit a DI in FY21 for future maintenance costs and is currently completing a sustainability plan to assess the amount of future costs. This initiative is unfunded and the timeline is FY20-23.

Environmental Records Management

The Environmental Divisions at CDPHE currently house their administrative document record in a cloud hosted version of HP Records Manager. The contract for this service is set to expire in FY20. Working with OIT, the department is currently evaluating whether to conduct a request for proposal to continue to support the Records Manager or request Technology Advancement and Emergency Fund(TAEF) assistance to migrate to OIT's Enterprise Document Management solution. This initiative is funded and the timeline is FY19-23.

Health Facilities System Rewrite Phases I and II

This division acts on behalf of the Federal Centers for Medicare and Medicaid Services (CMS) to federally certify health care facilities throughout Colorado. This division is also responsible for state licensure of these same facilities. For the business to be successful, this division needs to track licensure information in a way that can easily interface with the certification information it stores in the CMS-mandated federal system called ASPEN to which the state is unable to make programming changes. This project will replace approximately 35 small applications that have been gradually created over the last 20 years with one new application. It will modernize the way this division tracks information related to licensing health facilities throughout Colorado and easily link to the division's federal certification information. This project will both rationalize many applications and pay a significant amount of technology debt. Since this project will result in a minimum viable product (MVP), and the staff who will use it have become accustomed to the additional functionality of the old applications, this division will likely request a phase two for this project, and the CDPHE IT Steering Committee will likely require that the division augment internal OIT resources for that work. The division will submit a Decision Item for FY21 or beyond. For reference: This new application is called Colorado Health Facilities Information System (CoHFI). This initiative is unfunded and the timeline is FY19-22.

Health Information Exchange (HIE)

This project will allow CDPHE to continue to work with additional providers to develop interfaces to the Health Information Exchange. Continuing to integrate with HIE will facilitate the automatic, secure sharing of health information for the purposes of public health reporting. This also supports accurate and timely data that facilitates response to public health issues. This initiative is funded and the timeline is FY9-21.

Legacy Accounting System Stabilization

The legacy accounting system includes antiquated systems: CERS, MARS, BACS and EPICOR. CDPHE plans to decommission these legacy systems in FY19, but this process may trigger requests for other systems that may require funding requests, so these potential requests are included in this plan as a precaution. Still in early stages of planning. This initiative is funded and the timeline is FY19-21.

Microsoft Access Database Application Risk Mitigation

CDPHE has 30,000 MS Access files on its LAN drives. Some of these MS Access database files are mission-critical applications. CDPHE is working with OIT to define “application.” CDPHE will then determine how many of these MS Access files meet the definition of an application and need to be recorded in OIT’s Application Portfolio Management System (APMS). After the applications are identified and recorded, CDPHE will work with OIT to create plans for moving this subset of MS Access database applications into platforms that are more sustainable over time and supportable by OIT staff. The rest of the MS Access Databases will stay in place supported by the agency staff who created them. OIT does not support the non-application MS Access files created by CDPHE staff. OIT does install and patch MS Access as part of the MS Office Suite. Taking on the support of the MS Access database files that are actually considered applications may require more OIT resources, but this effort is in the very early planning stages; therefore, information about funding or timing is currently not available. This initiative is unfunded and the timeline is FY19-23.

Microsoft Sharepoint Online Upgrade

SharePoint is a collaborative portal that enables the use of electronic forms with approval workflows, electronic document management, one location for accessing all items, and data collection and display to include real-time dashboards for a variety of data elements like process duration, volume, and status. CDPHE currently has several divisions using SharePoint. One of those divisions, Administration/ Operations, whose work affects all CDPHE staff, submitted a FY19 Decision Item to fund an upgrade from SharePoint 2010 to SharePoint Online. That Decision Item was approved. At least three other divisions of CDPHE are also using the existing SharePoint 2010 environment, and they are still working on plans for supporting those services into the future. The division with the largest SharePoint footprint is the Water Quality Control Division (WQCD), and they are exploring options for moving off SharePoint. Their efforts are in the very early planning stages, so details about funding requirements and timing are not yet available. This initiative is funded and the timeline is FY19-23.

Network Cabling Upgrades

The cabling that passes network traffic between buildings on the main campus to individual workstations, conference rooms, and other areas is aging and will need to be updated to keep up with advances in technology. Additionally, the bridge between the B and C buildings will be taken down in the next few years. Cables will be run from the B building to the C building across that bridge, so we plan to bore between the buildings and run new cable. Upgrading the cabling infrastructure will prevent latency or full failure in the sending of network traffic and allow OIT to meet increased demands for bandwidth and speed in the future as people increase their use of video. The cost of updating this type of agency infrastructure is not covered by OIT funds, so CDPHE will request funds for this currently unfunded effort 18 months before it is needed if it exceeds the amount that CDPHE’s IT operating funds can cover. This initiative is unfunded and the timeline is FY22-23.

Newborn Hearing Screening

The Birth Defects Monitoring and Prevention Program does not actively follow-up on newborns who failed or missed an initial hearing screen, or collect additional information on the newborn to ensure she or he was connected to appropriate diagnostic and treatment services as required by a recently-passed 2018 legislative bill. To track information gathered from all newborn initial, second and subsequent hearing screens, this data must be entered into a new HIPAA-compliant information technology system. The information technology system must be web-based so that information can be collected by staff at the birthing facility, midwife or audiologist and entered into the system for tracking. This initiative is funded and the timeline is FY19-20.

Newborn Metabolic Screening LIMS

The current laboratory information management system (LIMS) for the Colorado Newborn Metabolic Screening Program has been in place since 2006. Updates have been made to the user interface and functionality over time but the underlying architecture is antiquated and is not configured ideally, e.g., in the current implementation, applications are installed on individual workstations, which has led to significant and fundamental differences in system performance depending upon which workstation was used. A new system is needed to provide support for all key information management functions for the Colorado Newborn Screening.

The current system requires Windows 2007 on individual workstations, which will not be supported after January 2020.

CDPHE completed an RFI for this system in FY19 and found that a cost for this system is difficult to estimate due to the complexity of the systems and the range of possible solutions available to meet this need. Estimated first-year costs of a new LIMS for the NBS Program are \$800,000 to \$1,000,000, with subsequent years' maintenance costs of \$160,000 annually.

OS Server Upgrades

As Windows Servers (2003, 2008 and 2012) reach their end-of-support lifecycles, it is increasingly difficult to find service providers who continue to support these operating systems (OS). To ensure state servers continue to receive appropriate support and reduce risk, OIT will retire and replace all server end-of-support operating systems used by supported agencies. Moving to a newer version will give customers a more secure and supportable OS for their applications. The Enterprise Applications and the Server Admin teams will work together to determine the affected applications in FY19 and migrate the servers to the new OS in FY20 & FY21. This initiative is unfunded and the timeline is FY19-21.

Performance Evaluation Planning (PEPS) Upgrade and HRWorks future phase

This system for tracking annual performance plans and evaluations for staff is approaching end-of-life. CDPHE has learned that HRWorks phase one will not include this functionality, but a future phase might. CDPHE's current system is antiquated and fragile and might fail before PEPS becomes a function of HRWorks. CDPHE does not have enough information about future events to request funds for an interim solution now. This initiative is funded and the timeline is FY21-22.

Separation of Duties between CDPHE and OIT Initiative

This initiative is the result of findings from the 2017 IT Performance Audit of CDPHE. Some of the relevant language from those findings is paraphrased below:

1. OIT should re-evaluate resource allocation and determine if more resources should be allocated to CDPHE IT needs,
2. OIT should develop, document, and implement formal processes to monitor and perform oversight activities for CDPHE workers who conduct IT-related functions as the IT service provider for CDPHE, and
3. The Colorado Department of Public Health and Environment (CDPHE) should work with OIT to strengthen account monitoring controls by: Identifying IT functions being performed by CDPHE staff; and, until OIT begins performing all IT service provider functions, CDPHE should utilize OIT training to provide CISP and OIT Cyber Policy security and awareness training to members of the CDPHE workforce who perform IT functions.

CDPHE and OIT partnered on a plan to address these findings. That plan is outlined below:

- Year one (FY18): Discovery - Determine which CDPHE employees are doing what OIT work and why;
- Year two (FY19): Plan - create a plan to address what was found in year one and start formulating requests for resources. This will likely involve a FY21 or later Decision Item requesting resources to allow OIT to absorb the IT-related work currently being done by CDPHE staff;
- Year three (FY20 or FY21): Act - depending on the success of the work in the previous two years, act on the items in the plan from FY19 if resources are available.

This initiative is unfunded and the timeline is FY19-21.

Survey Research Call Center Manager

The Survey Research Program completes approximately 10,000 interviews annually. This includes collection of information for the CDC Behavioral Risk Factor Surveillance System which is to monitor health and behaviors of Coloradans and drive public health programming throughout the state. Specialized data collection software is required to display appropriate prompts for callers and record information collected. The Survey Research Program has used WinCati software for approximately 20 years and needs to upgrade to a newer version of the WinCati software to sustain data collection. The current system is on a Windows 2008 Server which will not be supported after December 2019. The Department is currently working to identify internal funds to support the system upgrade. If unsuccessful, the Department may need to submit a DI to cover the cost of the upgrade of the WinCati software. This initiative is unfunded and the timeline is FY20-21.

Windows 10 Upgrade

Support for the Windows 7 operating system (OS) expires in January 2020. To ensure there is no lapse in support, OIT will upgrade all Windows 7 computers (desktop and laptop) to Windows 10. This is a multi-year effort that spans 17 agencies and more than 28,000 devices. The Microsoft Enterprise License Agreement (ELA) will cover the upgrade for all agencies except four that will need to cover the cost of the upgrades: CDHS, CDOC, DNR and HC. This is a multi-year effort that is expected to be complete in FY20. This initiative is unfunded and the timeline is FY19-20.

New Solutions

These initiatives provide new yet fundamental service to agencies. Heightened end-user technical expectations are driving service providers to strengthen system functionality. Delay in implementing these new services in the coming years would exacerbate major inefficiencies and significantly impair the state from meeting citizen expectations.

Backup Data Center Connectivity and CDPHE Presence

For the past ten years CDPHE has, and continues to, partner with OIT on state-wide data center consolidation efforts. As of FY19, the server footprint in the server room on CDPHE's main campus is a fraction of what it was when this effort started. Also, in FY19 CDPHE installed a generator to ensure connectivity to eFORT, the state data center, from the main campus in the event of a dry power outage that affects the main campus A building. In the next year or so, the last few servers that need to move to eFORT, will be moved. The next step for this work is to establish a presence in and connectivity to a backup data center as part of CDPHE's Continuity of Operations (COOP) plan. This would be established at the other state-wide data center in Lakewood. This initiative is unfunded and the timeline is FY20-23.

Business Intelligence

CDPHE has transitioned to new dashboarding tools using the recently purchased Tableau Server and several desktop licenses. This application transforms raw data into dynamic interactive tables and graphs and thus facilitates better decision making. CDPHE is currently planning to submit a FY20 Decision Item for staff and funds to continue and expand this system that has already proven valuable and saved CDPHE staff time they used to spend creating static reports and data visualizations. The original cost for the tools was \$317,000. The annual renewal will be \$70,000 per year. In addition:

- Desktop licenses - for individual users to create and post public information. Cost: \$1,500 initial cost + \$450 each year (annual renewal)
- Server core license - allows for more users across the department and allows for visualizations to be created with data that needs to be kept in-house (data that cannot be posted on the Tableau public site such as vital record data, disease investigation, etc.)

This initiative is funded and the timeline is FY19-23.

Colorado Environmental Online System (CEOS)

Colorado Environmental Online System (CEOS) will be a customer portal that will span across the environmental divisions at CDPHE. Currently, the department has the system in production and is adding new processes to the platform. It provides clear visibility and greater timeliness of processes with established milestones. The external customer can track the status of a request as it moves through the regulatory process. Errors in online regulatory application submittals will be immediately flagged for correction by the online system, resulting in faster turnaround. Improved processes result in greater programmatic effectiveness and greater capacity to devote to other work priorities that achieve the mission of the organization for departmental staff. The department estimates that it has at least 300 processes that can benefit from this type of system. As an example of the benefits, the department receives an average of 1,500 stormwater construction general permit certification applications a year. Basing calculations on work done by other states, we expect to see the time for each certification issued decreased by seven days with a resulting total savings of 225 hours of work saved by staff per year. These outcomes will vary by process. This initiative is funded and the timeline is FY19-23.

Data Integration Platform

Working with OIT, the department is evaluating an Enterprise solution to integrate the various data systems and more effectively utilize the data assets. This includes interactions between internal systems, other state agencies, federal agencies and the general public. To complete this, the department is completing a series of pilots to understand the functionality and viability of the enterprise solution. If the pilots are successful, the next phase will be to implement the product as a departmental solution. This initiative is unfunded and the timeline is FY19-21.

DocuSign

The DPA's Office of the State Controller (OSC) has developed an electronic signature policy that allows state agencies to use electronic signatures on state contracts and grants. Additionally, in accordance with OIT's technical standard, an OIT Enterprise Agreement with DocuSign has been established to process all state electronic signatures. CDPHE welcomes this new policy and the new solution provided by OIT and is trying to see how quickly it can be implemented. If OIT already has a way to allow CDPHE to easily acquire DocuSign, CDPHE would like to make this a priority for the next contracting cycle. This initiative is unfunded and the timeline is FY20-21.

Enabling CDPHE Remote Workforce

CDPHE is starting an effort to move remote work for CDPHE staff from tolerated to encouraged. This will require, policy work, buy in and technology changes. Those technology changes may require funds above and beyond existing agency funds. This initiative is unfunded and the timeline is FY20-21.

HR Application Migrations

HR Works will not have all of the functionality that was expected. Agency systems supporting functions other than Client Demographics, Position Management and Benefit Management may need to be migrated to existing systems that are currently supported. This effort will take collaboration from the ITD, Business, and Sr. EA Manager. This initiative is funded and the timeline is FY20.

Water Quality Control Division - Application Modernization

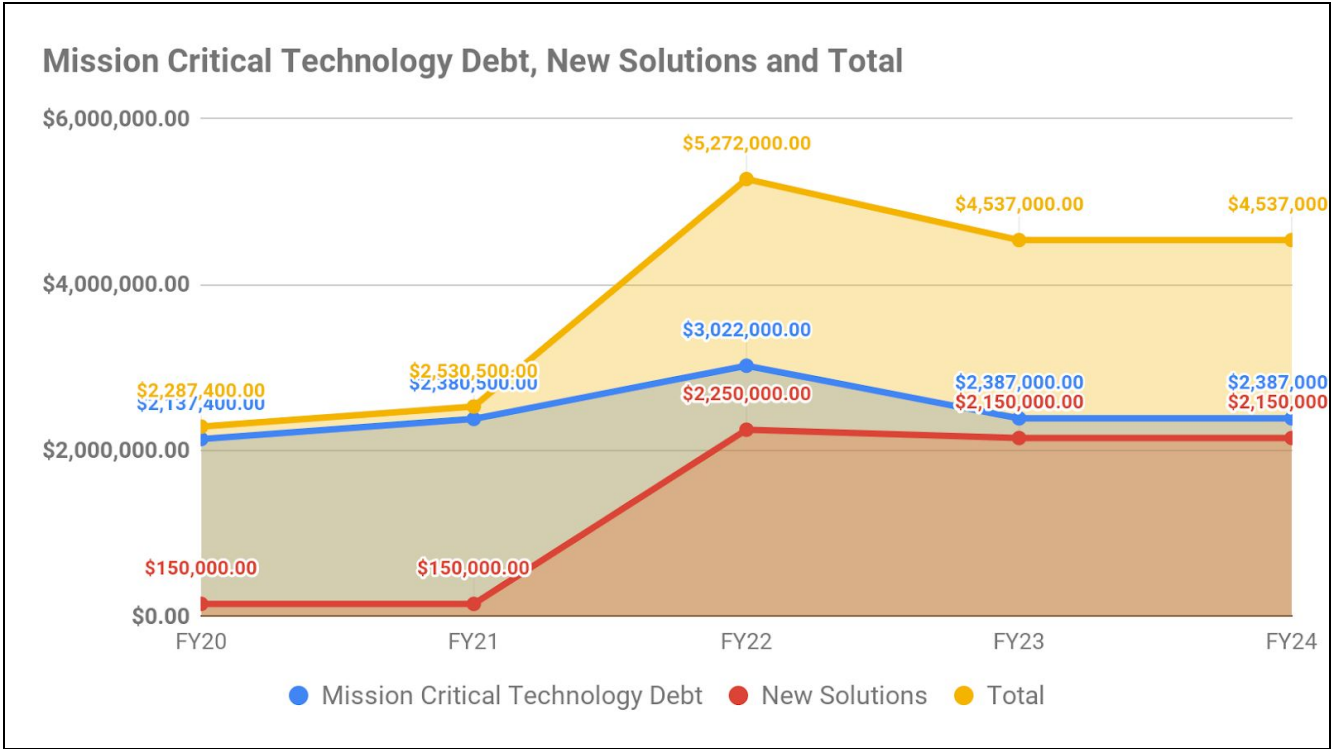
The modernization of applications within the Water Quality Control Division will provide a clearer picture of water quality within Colorado. The application modernization effort will combine many different existing software and manual (paper) applications into a scalable data clearinghouse. This effort will produce internal and external efficiencies through improved automation and data flows. One example of an internal efficiency will be the use of web and mobile-enabled interfaces for the collection, storage and exchange of critical sample and inspection data. Modernization will remove many manual processes currently used to produce and exchange regulatory data. Utilizing various application program interfaces will allow the division to link data from external sources to internally collected data providing a clear picture of water quality in Colorado. This information is frequently shared and used by a variety of stakeholders including: federal partners, other state agencies, drinking water systems, permitted entities, watershed groups, interested citizens, academia, consultants, etc. Process documentation and data consolidation has already begun in one-half of the division. The modernization effort will grow to encompass most of the information collected, analyzed and shared by the Water Quality Control Division. This effort is in the early planning phases. CDPHE has yet to determine what combination of internal OIT resources and external vendor resources will be used to meet this need. This initiative is unfunded and the timeline is FY19-23.

CDPHE Unfunded Technology Outlook

The totals below are high-level cost estimates where funding has not been clearly identified. In most cases, for technology initiatives defined as an OIT enterprise initiative, OIT seeks funding through Decision Items. Enterprise initiatives help ensure that the state maintains consistent technology service and is able to take advantage of scalable rates.

For a more detailed breakdown, contact your agency’s IT Director.

	FY20	FY21	FY22	FY23	FY24
Mission-Critical Technology Debt	\$2,137,400.00	\$2,380,500.00	\$3,022,000.00	\$2,387,000.00	\$2,387,000.00
New Solutions	\$150,000.00	\$150,000.00	\$2,250,000.00	\$2,150,000.00	\$2,150,000.00
TOTAL	\$2,287,400.00	\$2,530,500.00	\$5,272,000.00	\$4,537,000.00	\$4,537,000.00



Appendix A: Enterprise Initiative Roadmap

The timeline below represents OIT’s enterprise initiatives. Enterprise initiatives help to ensure that the state maintains consistent technology service and is able to take advantage of scalable rates. These initiatives are part of OIT’s overall strategic direction and may be mandated or offered to agencies optionally.

This timeline has been included to provide a reference as to how an individual agency’s IT Roadmap correlates to OIT’s enterprise plan. Descriptions of each initiative can be found in Appendix B.

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Enterprise Initiatives							
	Application Lifecycle Management						
	CORE NIST File Transfers						
	Clarity PPM (CA PPM or Clarity)						
	Enterprise Infrastructure Refresh						
	HRWorks						
	Mainframe Decommission						
	Network & Infrastructure Refresh						
	Next Generation Colorado						
	OS Server Upgrades						
	Telecom Enhancements (MIPC)						
	Two-factor Authentication						
	Windows 10 Upgrade						

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New Solutions	Antivirus Protection Removal					
	Content Services Application Consolidation					
	Content Services Enterprise Solution Deployment					
	CrowdStrike					
	Desktop Cloud Backup					
	MyColorado					
	Privilege Access Management					
	Salesforce Platform Org Strategy					
	Salesforce Lightning Migration					
	Salesforce Release & Environment Management					
	Secure Office Print Ecosystem (SOPE)					
	Technology Accessibility and Mobile Assessment, Testing and Remediation					
	Future Innovations	Cloud Access Security Broker				
Data and Access Governance						
Cloud Access Security						
East West Traffic Security						

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	Easy Secure Service Excellence - ESSE					
	End-to-End Monitoring and Logging					
	Identity Analytics and Risk Intelligence					
	Server and Deskside Endpoint Management					
	Smart Cities Exploration					

Appendix B: Enterprise Initiative Details

This section provides an overview of each Enterprise Roadmap initiative.

Mission-Critical Technology Debt

These initiatives are vital to the functioning of normal government services. Delay in pursuing the initiatives will create a need for future effort and resources that surpass those needed if the initiatives are carried out proactively.Æ

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With an inventory of 1100+ applications, a key strategy for OIT is to streamline the application footprint. Through the consolidation of existing and new applications onto standard enterprise platforms, OIT can create a simpler and easier end-user experience, reduce the long-term cost of maintaining duplicative applications, and strengthen OIT's support capabilities. Consolidation efforts completed through FY16 were funded through the Eliminate Redundant Applications Decision Item; with the funding of the Service-Oriented Business System Refresh Decision Item, \$800,700 will be approved for this program in future years. Allocation of the funds will be under the authority of an agency focused governance team. This funded initiative impacts all agencies and the timeline is FY20-23.Æ

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The CORE secure file transfer service provides file transfer services between the State (all agencies, Wells Fargo and other external/higher ed institutions) and the CORE financial system. The CORE file transfer service was originally implemented during the CORE project as a temporary service. The service compromises regulatory compliance and security of the assets entrusted; has significant risks from process and personnel perspective; Although meant to be a secure file transfer server, this asset is also using for archival of data files and the nature of that use compromises both the asset and the content. Data currently on the CORE secure file transfer server needs to be migrated to the properly structured and organized file storage and appropriate archiving and retrieval processes need to be established. If not executed there will be severe impacts to the CORE system and continued audit findings, it will cause a drain on OIT resources needed to support the current solution and perpetuation of risk due to inadequate business processes and inadequate, costly IT solutions supporting those processes. CORE secure file transfer server replacement will require any current department/agency user of CORE to become a consumer of technology platforms (Automic and MoveIT) providing new CORE integration services. This unfunded initiative impacts all agencies and the timeline is FY20.

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Clarity PPM is a comprehensive Project and Portfolio Management Tool in use by OIT and other agency customers to track and report on projects, programs and maintenance activities across the State enterprise. In recognition of this, OIT will begin distributing the costs associated with the tool by user license and type. Invoices are received from the vendor on or about July 1 of each fiscal year. OIT will produce a report of all users on July 1 of each year and based upon license type disburse the expense amongst the agencies of the user community. This initiative impacts all agencies and the timeline is FY20.

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This effort includes refreshing infrastructure support equipment (power, HVAC, UPS systems, etc.) for all agencies in order to ensure service uptime is in accordance with our service level commitments. This unfunded initiative impacts all agencies and the timeline is FY20-23.Æ

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The Department of Personnel & Administration (DPA) and OIT continue their work to develop an enterprise Human Resource Information System (HRWorks). The HRWorks project is a collaborative effort to consolidate approximately 80 disparate, outdated, and redundant systems into a modern, seamless solution that will eventually integrate with CORE, the state's financial system of record. Development of the system is funded through a DPA FY16 Decision Item. At this time the HRWorks project consists of human capital management (HCM), benefits module, payroll, labor allocation and timekeeping. Work is underway to identify the impact to each agency. Decommissioning of CPPS and related applications will be handled as a separate project. This funded initiative impacts all agencies and the timeline is FY20-22.

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OIT is working to retire the mainframe and associated applications. Integration and data sets must be identified and planned for migration or retirement. This includes determining agency costs. Agencies that still have applications on the mainframe include the Departments of Human Services, Labor & Employment Personnel & Administration, and Revenue. Additionally, with the state payroll system on the Mainframe, all agencies are impacted by this initiative. OIT has identified dependencies amongst other large projects that will prevent the retirement of the mainframe until functionality residing on the mainframe moves to new applications, and will require agency funding to address agency-specific migration and services costs. This funded initiative impacts all agencies and the timeline is FY20-22.

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OIT is developing a statewide refresh lifecycle that will annually replace 20% of network and systems infrastructure that is at its manufacturer's end-of-support lifecycle. This will keep the state's technology current and under warranty, which ensures continued support for these critical components. Customers will experience increased IT system performance with decreases in downtime, outages and lost connectivity with the added availability of a secure and stable infrastructure. This is an ongoing effort that will incur some impact to each agency each year. The effort has been funded through the FY16 Infrastructure Refresh Decision Item; however, the funding does not cover all the needed network refreshes, so agencies will need to fund part of the agency-owned network components. The systems infrastructure portion of the refresh initiative includes shared storage and vBlock hosting platforms in the two state data centers; agencies do not pay additional funding outside the Decision Item budget line for this portion of the refresh effort. This unfunded initiative impacts all agencies and the timeline is FY20-23.

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This is a two-part initiative representing infrastructure and operational improvements as well as data center modernization. Next Generation Colorado is an initiative to develop the automation and operations to support quick service delivery, transparent cost modeling, scalability on-demand, high availability, upgrades and agility of workloads across the enterprise. This effort will also include data center modernization, operational management and hybrid cloud solutioning to span private and public Infrastructure as a Service (IaaS) models. This is a capital-funded initiative from a FY18 Decision Item. Half of the funding was approved for use in FY19 and will support cloud readiness and sustainability, security improvements and data center repairs. The second half of the funding is expected to be approved for use starting in FY20 and will be used to continue our FY19 work as well as automation and service efficiencies. This funded initiative impacts all agencies and the timeline is FY19-23.

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As Windows Servers (2003, 2008 and 2012) reach their end-of-support lifecycles, it is increasingly difficult to find service providers who continue to support these operating systems (OS). To ensure state servers continue to receive appropriate support and reduce risk, OIT will retire and replace all server end-of-support operating systems used by supported agencies. Moving to a newer version will give customers a more secure and supportable OS for their applications. The Enterprise Applications and the Server Admin teams will work together to determine the affected applications in FY19 and migrate the servers to the new OS in FY20 and FY-21. This unfunded initiative affects all agencies and the timeline is FY19-21.

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To keep our phone technology current and consistent, OIT's Telecommunications Team will migrate agencies from their stand alone Cisco VoIP systems to the enterprise Managed IP Communications (MIPC) voice solution. The multi-year initiative is in the planning phase for the four remaining agencies: CDPHE, DNR, DOLA, CDHS/CMHIP. Implementation will occur as the current stand alone Cisco VoIP system approaches end of life in each of the agencies. This unfunded initiative impacts CDHS, CDPHE, DNR, DOLA, DOC and the timeline is FY20-22.

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OIT will enable two-factor authentication (2FA) to add an extra layer of security to the verification process and thus reduce the risk of data breaches and meet data privacy requirements. OIT's internal and statewide Access Control policies require that access to the state's information systems be restricted to just those who need access to perform their jobs, using the principle of least privilege. The implementation to CDHS, CDPHE, DNR, DOLA will be completed by the end of FY20.

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Support for the Windows 7 operating system (OS) expires in January 2020. To ensure there is no lapse in support, OIT will upgrade all Windows 7 computers (desktop and laptop) to Windows 10. This is a multi-year effort that spans 17 agencies and more than 28,000 devices. The Microsoft Enterprise License Agreement will cover the upgrade for all agencies except four that will need to cover the cost of the upgrades: CDHS, CDOC, DNR and HC. This is a funded initiative and has a timeline of FY20.

Enterprise New Solutions

These initiatives provide new yet fundamental service to agencies. Heightened end-user technical expectations are driving service providers to strengthen system functionality. Delay in implementing these new services in the coming years would exacerbate major inefficiencies and significantly impair the state from meeting citizen expectations.

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Per the findings from a recent audit, Enterprise Content Services (ECS) will strategically assist agencies in transitioning and migrating away from unsupported, legacy content services applications. The goal is to eliminate redundant agency deployed ECM applications, which will dramatically reduce agency hardware and software costs by leveraging our Enterprise License Agreement with Hyland. Furthermore, this will streamline content management applications and directly support the playbook strategy of "Strengthening Colorado's Technology Landscape". We will continue to move the states legacy and/or unsupported applications to our enterprise content services platform, which will reduce the total number of applications. The EDW application is the immediate focus in FY20-FY22 and is used by 14 agencies today. HP Records Manager deployed at CDPHE will also drive forward in FY21-FY22. This initiative is unfunded and the timeline is FY20-24.

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ECS is continuing to develop enterprise solutions that can be leveraged by all agencies - highly standardized with an ability to customize via embedded non-code configuration will dramatically increase time to value. Agencies will directly benefit with improved operational efficiency, document/information sharing, visibility and cloud infrastructure. This effort ties to many of the agency application modernization efforts. Targeting License, Permitting & Inspections, Contract Management, Electronic Requisitions, Employee File Management, and Travel Requests, Approval & Reimbursement solutions. These solutions will improve business processing times and bring complete visibility to each business lifecycle, saving time and money! Content Services enables us to establish these enterprise solutions, which become standardized products offerings in our solutions portfolio. This initiative is based on the assumption that approximately half of the agencies leverage each of the following solutions:

1. License, Permitting & Inspections - OIT pilot is underway. Standard service offerings are slated for FY20.
2. Contract Management - contract creation through signatories (integrated with DocuSign). OIT project in-flight.
3. Electronic Requisitions - complete processing of funding requests with dump into CORE - already live at OIT.
4. Employee File Management - focus on capturing and managing HR employee files. OIT and CDOT are in-flight.
5. Travel Requests, Approval and Reimbursements - already live at OIT.

This unfunded initiative affects all agencies and the timeline is FY20-24.

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Deploy CrowdStrike across all agency systems to provide the very best endpoint security and protection from current threats, for the agency. This is a funded initiative and the timeline is FY20 - FY24.

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OIT will be providing expanded backup services across the state in the future. This expanded service will now include providing backups of documents and files that are stored on individual laptops and desktops. This is a funded initiative and the timeline is FY20 - FY24.

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OIT is leading the effort to create a mobile application that will deliver current and future agency services on a modern and mobile platform. The myColorado app will provide residents, visitors and businesses easy and secure access to services via Federated Identity Management for users engagement through a single interface accessible anytime, anywhere. The solution will provide easy integration for agencies wanting to add a service to the app. It will provide users a protected entry point into state services, and once they establish a profile, it will reduce the need to re-enter that data. Phase 1 is the release of the app through the Department of Revenue in FY19 with the initial services of driver license and vehicle registration renewal as well as the ability to store a digital copy of a vehicle insurance card. It will also include the ability for the Governor's office to provide direct communication to app users. Future phases will include the integration of services provided by multiple state agencies. Phase II, could include state services provided by DNR, DOC, DOLA, DPA, CDPS and CDE. The planning efforts are underway which includes determining costs and funding. This is a funded initiative and the timeline is FY20.

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Assess endpoint security tools to ensure the most effective security while minimizing performance impact. This may result in the lessening or removal of the McAfee endpoint agent, and may incorporate additional tools and capabilities to ensure appropriate anti-virus, encryption, and patching. This is a funded initiative and the timeline is FY20 - FY24.Æ

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This is an effort to implement a least privilege management solution to oversee enterprise password management over privileged credentials, application password management and session logging and server privilege management to ensure administrator and root security and compliance. The benefits are many and include: a dashboard for operations, management and audit reports; an open standards tool that integrates with ITSM, IDM, Active Directory, etc.; automatic discovery of systems with privileged access; automating the creation of role-based access; assisting in role definition/creation; and secure employee exit de-provisioning which currently relies on manual processes that create security risks and the loss of assets. This funded initiative affects every agency and the timeline is FY20.

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Defining a Salesforce Org Architectural Strategy to improve business/IT alignment, platform effectiveness and IT cost savings is part of the Salesforce Program strategic initiatives planned to continue transforming how government innovates, maintains and promotes secure cloud-based agile technology platforms in an enterprise model. This approach will account for the OIT enterprise Salesforce support model and application management best practices. This initiative is unfunded and the timeline is FY20-24.

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Continued migration of existing legacy applications to and development of all new applications in the Salesforce Lightning (UI) is an effort to maintain the quality of the platform and accessibility to new product features. This is part of the effort to improve business/IT alignment, platform effectiveness and IT cost savings. It is part of the Salesforce Program strategic initiatives planned to continue transforming how government innovates, maintains and promotes secure cloud-based agile technology platforms in an enterprise model. This initiative is unfunded and the timeline is FY20-24.

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Salesforce Release & Environment Management practices and tools to govern how changes occur between the platform and various environments is an effort to minimize application issues and protect the integrity of existing applications in the multi-use environment when deployed to production. This initiative is unfunded and the timeline is FY20-24.

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OIT is working with the Department of Personnel & Administration (DPA) on the Secure Office Print Ecosystem (SOPE) project to secure the state's multifunction printers against hackers. This project involves approximately 656 devices managed by DPA's Multifunction Printer Program, which are distributed in 16 executive branch agencies. As members of the SOPE project, OIT's security and deskside teams are helping to upgrade firmware and secure the printer platform and its entry points into the state network. OIT is also providing project management services. DPA is incurring all costs associated with this managed print service solution. This unfunded initiative affects all agencies and the timeline is FY20.

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OIT has a statutory obligation to work with executive branch agencies to improve technology access for users with disabilities, including those who are blind and/or visually impaired (see C.R.S. 24-85-101 et seq). To fulfill our duty to improve these services, OIT must provide tools, methods and resources to adequately assess, remediate and maintain the systems for their ability to provide proper accessibility (in conformance to industry standards). This initiative will establish project governance, application testing requirements, standards and training to achieve the goals and mandates of this statute. Any changes needed to address accessibility within an agency will be funded by the agency. The initiative is scheduled for assessment in FY19-20 and remediation thereafter.

Enterprise Future Innovations

The ideas in this section have been proposed as solutions that will allow OIT to grow and discover new and innovative services for state agencies. The solutions in this section will increase state employee efficiency and improve service to Colorado residents and state visitors. These ideas are either unfunded or funded through Decision Item funding. We may see these as new projects in the future.

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Cloud Access Security is a software functionality that enables automation of manual processes used to govern the use of and protect sensitive state data in the cloud. As cloud computing continues to grow, OIT needs a way to deliver consistent security across multiple clouds and protect everyone using that data, this is outside of on prem data storage. The solution is scheduled to go active in FY20 with ongoing funding each year thereafter. This funded initiative impacts all agencies and the timeline is FY20-24.

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This initiative ensures that sensitive, unstructured data is only accessible to approved users. Funding will be used to implement data governance to analyze, approve and fulfill unstructured data access to files, folders, shares across Microsoft NTFS file systems, Network Attached Storage (NAS) devices and SharePoint - on prem storage. The solution is scheduled to go active in FY20 with partial ongoing funding each year thereafter for maintenance. This funded initiative impacts all agencies and the timeline is FY20.

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The East West Traffic Security initiative addresses vulnerabilities present within the traffic going to public cloud, traffic between agency-to-agency applications, and traffic from network to servers. These initiatives are the "glue" that helps bind the security infrastructure together, representing agency network upgrades and firewall upgrades and enhancements. They cross the functional infrastructure, Network, Access Control and Security Operations. The solution is scheduled to go active in FY20 with partial ongoing funding each year thereafter for maintenance. This funded initiative impacts all agencies and the timeline is FY20.

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The Enterprise Application team is requesting a network solution that will allow all application developers to access the code at any agency in the Executive branch. At this time, firewall rules and servers are set up currently, because each agency has its own network, developers would need remote access to 17 agencies to perform work. This request is being made in hopes that Enterprise Applications will be able to align with Demand Management infrastructure, enabling developers to serve across many domains, working across a multitude of practices. This structure will directly impact the level of service EA is able to provide to the customer. In order for EA to move to a Service Excellence model, this demand must be met. This unfunded initiative impacts all agencies and the timeline is FY21-24.

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This initiative will increase the annual budget for this particular activity, which enables OIT to have the platform to automate, manage and patch more endpoints and at a faster pace. Technical training and incident response retainer are inclusive of this initiative. The anticipated outcome of this initiative is that all agency endpoints would be aligned under a common platform that deploys scripts, patches, and updates for proper security compliance and hardening. In short, agencies can expect to see the number of vulnerable endpoints to be drastically reduced. The solution is scheduled to go active in FY20 with ongoing funding each year thereafter. This funded initiative impacts all agencies and the timeline is FY20.

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OIT would like to incorporate identity analytics into our security and big data strategy using machine-learning and advanced behavioral analytics that consume and analyze data and will improve our capabilities to detect and respond to risk timely, help with digital change, increase agility and enable higher levels of automation. This funded initiative impacts all agencies and the timeline is FY20.

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This initiative will increase the annual budget for this particular activity, which enables OIT to have the platform to automate, manage and patch more endpoints and at a faster pace. Technical training and incident response retainer are inclusive of this initiative. The anticipated outcome of this initiative is that all agency endpoints would be aligned under a common platform that deploys scripts, patches, and updates for proper security compliance and hardening. In short, agencies can expect to see the number of vulnerable endpoints to be drastically reduced. The solution is scheduled to go active in FY20 with ongoing funding each year thereafter. This funded initiative impacts all agencies and the timeline is FY20.

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A smart city is a designation given to a locality that incorporates information and communication technologies to enhance the quality and performance of urban services such as energy, transportation and utilities to reduce resource consumption, wastage and overall costs. Traditional smart city projects focused on community internet access, smart lighting, transportation and citizen data sharing. State effort around smart cities would be focused around the coordination of infrastructure and standards to enable smart applications that seamlessly transition as residents transition from one locality to another. This unfunded initiative impacts all agencies and the timeline is FY20-24.

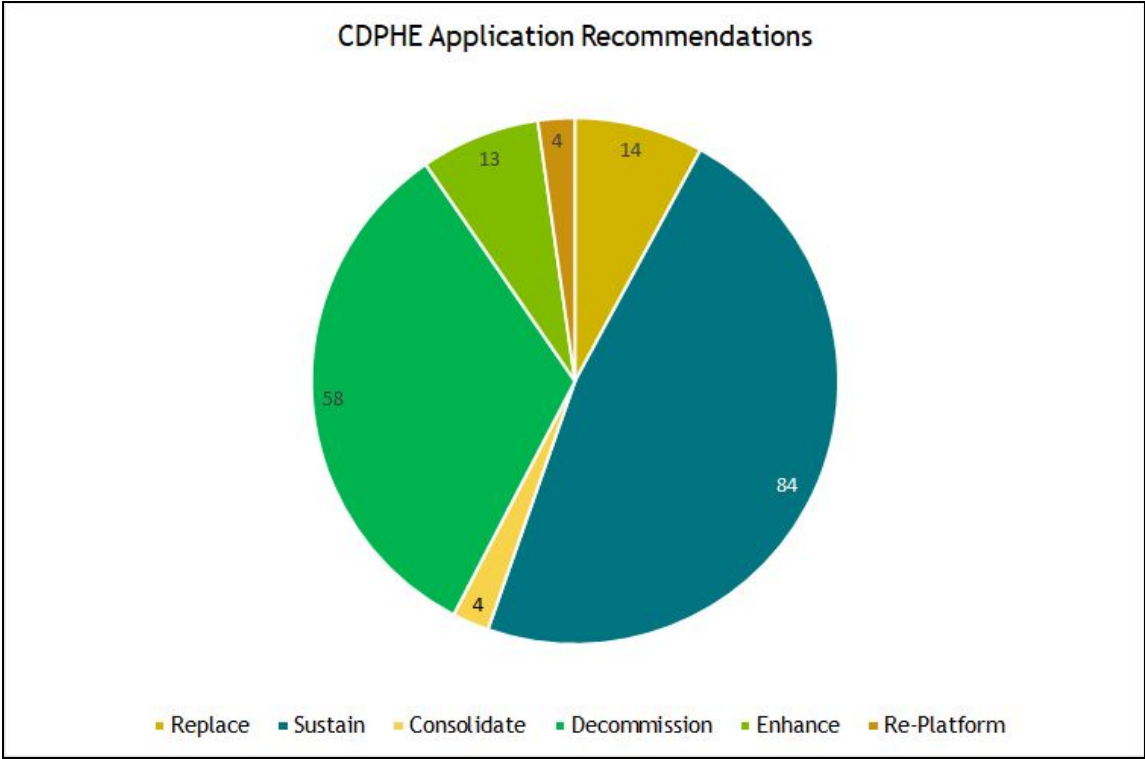
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Appendix C: CDPHE Application Lifecycle Recommendations

The table and chart below show the applications used by CDPHE, and the lifecycle recommendation for each application. In future years this will be expanded to include the application lifecycle timeline. The definitions for the recommendations below are as follows:

- **Replace**: Recommended when more than one application is being used to perform a single process. The multiple applications should be consolidated to perform the process.
- **Decommission**: Recommended for applications that have a definite plan to be decommissioned.
- **Enhance**: Recommended when an application that needs to be upgraded requires a more significant effort to upgrade than a recommendation to sustain.
- **Re-Platform**: Recommended when an application needs to be replaced with a newer application.
- **Sustain**: Recommended when an application has the proper functionality but may be written in an outdated language or database and needs to be moved to a better platform.
- **Consolidate**: Recommended when an application is functioning properly and does not require a major upgrade or change.





Colorado Department of Public Health &
Environment

Five-Year IT Roadmap