Five-Year IT Roadmap

Department of Natural Resources

Aligning business goals and technology forecasts

July 2019

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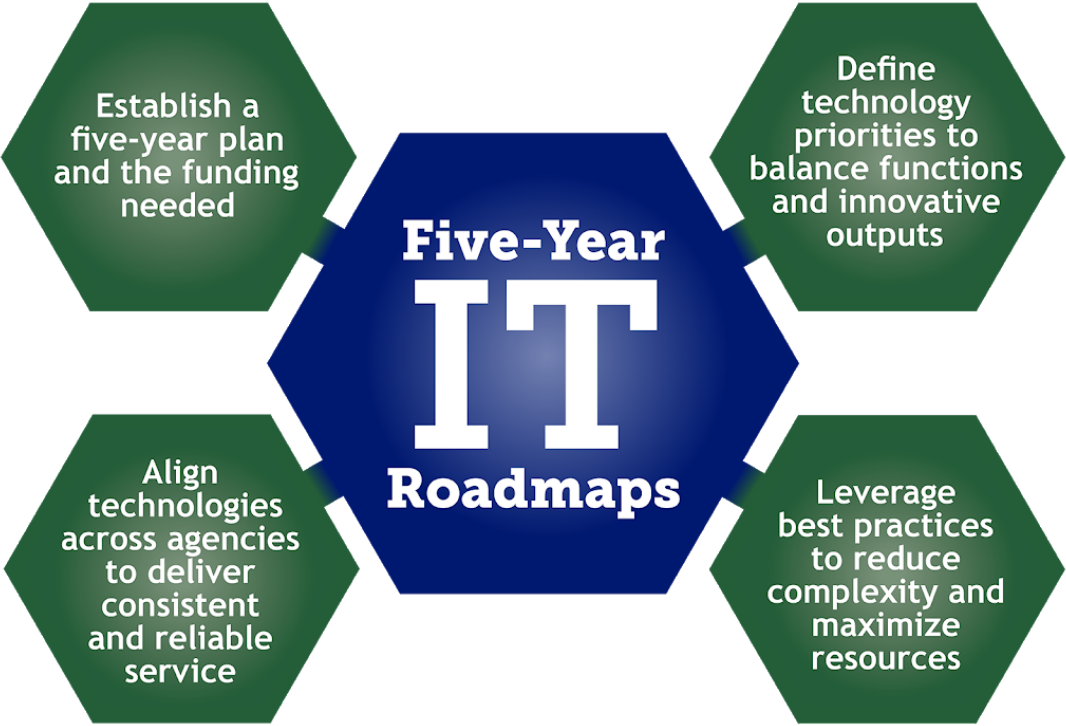**Governor's Office of Information Technology**
Serving people serving Colorado

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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

Establish a five-year plan and the funding needed

Define technology priorities to balance functions and innovative outputs

Five-Year IT Roadmaps

Align technologies across agencies to deliver consistent and reliable service

Leverage best practices to reduce complexity and maximize resources

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 Department of Natural Resources 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.

Goal 1

Successfully reform the COGCC and smooth implementation of new regs and rules.

SMART Goal (Option 1) Decrease enforcement action backlog from 145 to 100 by June 30, 2020
SMART Goal (Option 2) Decrease application backlog from 325 to 50 by June 30, 2020

Key Strategies:
- Complete passage of SB 19-181
- Complete 500 Series, Local impact, and public health and safety rule changes by December 31, 2019
- Complete stakeholder process for rule changes by June 30, 2020
- Appoint/reappoint new Commission members

Goal 2

Increases acres of available and accessible public lands and realign state land assets to administration priorities.
SMART (Option 1): Add [90,000] acres of public access easements, leases, and other agreements by June 30, 2020

Key Strategies:
- Public access is a top priority for the Colorado Wildlife Habitat Program (CWHP), accounting for more than one-third of the acreage acquired over the last ten years of the program. Continue to restore funding to the CWHP and retain public access as a key factor in acquisition decisions.
- Expand the focus of the Walk-In Access Program form small game hunting to include big game hunting opportunities, including on the west slope by investing an additional $250,000 annually.
- Continue the State Land Board Access Program, providing hunting and fishing access to more than 450,000 acres.
- Emphasize public access values in additional programs such as Corners for Conservation and Fishing is Fun.
- Convene a public access workgroup to support efforts to increase access.

Goal 3

Lead process to identify and increase sustainable revenue source for Colorado Parks and Wildlife (CPW).

SMART Goal (Option 1): To increase the relevance of CPW to outdoorists (as identified in the CPW Future funding Study), first establish a baseline on outdoorists' familiarity with CPW and their values by June 30, 2020.

SMART Goal (Option 2): Meet with [20?] outdoorist stakeholder groups to assess their level of support for new revenue source strategies and level of commitment to moving forward efforts to attain new sources by June 30, 2020.

SMART Goal (Option 3): By June 30, 2020, develop a toolbox for CPW staff to use in pursuing and securing sponsorship revenue.

SMART Goal (Option 4): By June 30, 2020, identify [3?] messages, appeals and narratives that reach outdoorists on intellectual and emotional levels that will move them to financially support CPW.

SMART Goal (Option 5): By June 30, 2020, estimate CPW's projected budget shortfall on an annual basis over the next 10 years.

Key Strategies:
- Design and conduct stakeholder outreach on potential next steps from the CPW Future Funding Study
- Launch CPW sponsorship website
- Evaluate and recommend options considered in the Meridian Report and other strategies to provide sustainable, fair, and sufficient future funding for CPW.
- Engage additional outdoorist on the Park and Wildlife Commission.
- Implement the fund development plan for increasing private donations recommended in the Pint b(e) Report, including strengthening and developing partnerships with external foundations and nonprofits.
- Develop a strategy to implement CPW's sponsorship policy, including the consideration of public-private partnerships.
- Pilot the use of cell phone applications and other methods to collect user fees and donations.
- Evaluate CPW staffing needs to address the customer service and environmental impact associated with a growing population of outdoorists engaging in activities such as climbing, mountain biking, whitewater paddling, skiing, off-highway vehicle and snowmobile use, and other adventure sports.

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.

		FY20	FY21	FY22	FY23	FY24
Mission Critical Technology Debt	Application Consolidation and Decommissioning		███	███	███	███
	Business Applications Modifications	███	███	███	███	
	Colorado Outdoor Recreation Information System (CORIS) - Phase III (Decommission)	███	███	███	███	
	Colorado Water Conservation Board (CWCB) Maintenance	███	███			
	GIS Environment Upgrade and Enhancements	███	███			
	Integrated Parks and Wildlife System (iPAWS) Phase II	███	███			
	IT Environment Upgrades	███				
	Major System Enhancements to HydroBase Data Management Console	███	███	███	███	
	Records Access Management System (RAMS)	███	███	███	███	

New Solutions	FY20	FY21	FY22	FY23	FY24
Cameo Shooting Range (2-5 Year Project)	██	██	██	██	
CPW Fort Collins Office Relocation	██	██	██	██	
CPW Remote Sites - IT Needs Assessment and Infrastructure Improvements	██				
CPW Website Rewrite	██	██	██		
CWCB Grant Portal	██	██			
CWCB Hazzard Mapping Website	██				
CWCB HB-1051 Reporting App	██				
CWCB Identified Projects and Processes Database (Project Database)	██	██			
CWCB SWSI Data Visualization Tool	██	██			
DWR Mobile Surface Water Conditions App (What's The Flow?)	██				
General Inventory Management Program (IMP) Improvements	██				
HR Application Migrations	██	██			
Landowner Preference Program (LPP) Phase II	██	██			
MyDWR Well Permitting Forms/ECommerce		██			

	FY20	FY21	FY22	FY23	FY24
OGCC Electronic Filing System for the Hearings Unit	▮				
Online Payment System	▮	▮			
OS Server Upgrade	▮	▮			
Real Estate Inventory and Inspection System	▮				
Survival Module Application	▮				
Trans6/AAHL/ADAMAS/ Creel	▮				
Volunteer Database System	▮				
Windows 10 Upgrade	▮				

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 efforts and resources that surpass the resources needed if the initiative were carried out proactively.

Application Consolidation and Decommissioning

At DNR, there are 24 applications recommended for decommissioning and four recommended to be consolidated with other applications. This will result in the requirement for Enterprise Applications to process decommission and consolidation plans and obtain agency approval to remove data and decommission servers. This initiative is unfunded and the timeline is FY21-24.

Business Applications Modifications

There is currently a backlog of approximately 123,150 hours of applications development work for either mission critical technology debt or new solutions over the next five years. Some of these efforts are listed in this plan but not all due to the lengthiness of the list. These enhancements are critical to these systems as they represent critical functionality to meet citizen and business program needs, and in two cases, it is to replace aging legacy systems that support key business functions. This initiative is partially funded and the timeline is FY19-23.

Colorado Outdoor Recreation Information System (CORIS) - Phase III (Decommission)

This project is part of the application development of pre-licensing draw for large game. It is one of three that collectively will replace the CORIS-INFORMIX application and system platform. The products of these projects are application redevelopment deliverables that move the application and database storage technologies from INFORMIX to .NET & SQL server. The CORIS system is operating on a legacy platform that requires a unique and expensive skill sets to maintain. Its architecture is fairly inflexible and cannot take advantage of the latest development technologies. Moving it to .NET & SQL server positions the application in a more standardized solution which is prevalent in the industry and within state government. This initiative is unfunded and the timeline is FY20-23.

Colorado Water Conservation Board (CWCB) Maintenance

Provide ongoing maintenance and support of CWCB's databases (Instream Flow and Finance). Fix bugs and add enhancements as requested by staff. This initiative is funded and the timeline is FY19-21.

GIS Environment Upgrade and Enhancements

Upgrade the current HTML5 environment that supports the Division of Water Resources (DWR), Colorado Water Conservation Board (CWCB) and Division of Reclamation, Mining and Safety (DRMS) (with a potential of Colorado Oil & Gas Conservation Commission) to reflect system development lifecycle best practices along with addressing versioning and time sharing issues being experienced in the current environment. There is also a rewrite effort for the existing GIS online system to accommodate new browsers and new technology features. Phase I will be to replace the functionality of the Map Viewer application. This project will focus on migrating the features and functionality of AquaMap - data flow automation, editing, legal calculator, etc. This initiative is funded and the timeline is FY19-21.

Integrated Parks and Wildlife System (iPAWS) Phase II

iPAWS has three additional components added to it over the next year: Hunter Reservations System, Vehicle Registration System and Special Licenses. There will also be minor enhancements to the user interface and system functionality to make it more user friendly. Additionally, this phase will also cover full decommission of the legacy system and some report development. This initiative is funded and the timeline is FY19-21.

IT Environment Upgrades

DNR was in need of a significant system refresh effort, so the agency has partnered with DOLA to combine funding to get this critical work completed as quickly as possible. Phase 1 included replacement of the core switch at 1313 Sherman Street along with all the routers and closet switches. Additionally, there is a mini-data center at 1313 Sherman Street location that will also be virtualized and moved to the state data center to enable more efficient use of their server inventory, as well as provide an increased ability to maintain and provide services. A number of DNR's remote locations will also have their network switches and routers replaced as a part of Phase 1. Phase II included upgrading additional remote sites, replacing most of the wireless access points at 1313 Sherman Street and other miscellaneous items that couldn't be funded as a part of Phase I. Phase III is scheduled for FY20 and largely includes upgrading additional remote sites and funding ongoing maintenance tools such as Solarwinds. These upgrades will result in both deskside support and information security needs that will significantly reduce security vulnerabilities. This initiative is funded and the timeline is FY20.

Major System Enhancements to HydroBase Data Management Console

This effort includes changes to a large number of modules including Groundwater Use and Measurement, AllPlan Integration, Well Tools/Final Permit, Diversion Record Editing, Publishing and Reporting, Board of Examiners, Water Courts, Water Rights Standards, Dam Safety, Hydro Geo Water Level Integration and Hydro Geophysical Log Integration. In response to issues surrounding interstate compacts and intra-basin concerns, the State Engineer promulgated rules regarding the measurement of groundwater for the following river basins: the Arkansas River Basin, the Rio Grande River Basin, the Republican River Basin and the South Platte River Basin. The core information needed to manage these rules is already in HydroBase Data Management Console (HBDMC); additional modules will be added to allow for the capture of additional data, management enforcement processes and integration with modeling applications. This initiative is partially funded and the timeline is FY19-23.

Records Access Management System (RAMS)

Colorado Parks and Wildlife would like to purchase an electronic records management system to replace two legacy systems currently in use for its law enforcement records. When the Division of Parks and Outdoor Recreation and the Division of Wildlife merged into one division in 2011, the existing law enforcement record systems did not merge and are completely separate systems. Violation Management System (VMS) and Law Enforcement Citation System (LECS) are both old systems(VMS is 17 years old; LECS is 11 years old) and use completely different technology platforms, so they cannot be merged into one. Additionally, there is a requirement that these systems interface with state courts systems, a function that the current systems cannot support today. This initiative is funded 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.

Cameo Shooting Range (two-five year project)

This project will be a new state of the art shooting range located in the western part of Colorado. It is new construction and will require all new technology infrastructure to support the staff that will eventually work at the range as well as the customers using the facility. This initiative is funded and the timeline is FY19-23.

CPW Remote Sites - IT Needs Assessment and Infrastructure Improvements

This project will include having a third-party assessment of all Colorado Parks and Wildlife remote sites to establish current IT Infrastructure needs and potential enhancements to the site. The goal is to then implement the recommendations of the third-party assessment to improve overall system architecture as well as to ensure the sites are equipped to serve Colorado citizens in the most effective manner possible. This initiative is unfunded and the timeline is FY19-20.

CPW Website Rewrite

The Colorado Parks and Wildlife website needs to be redesigned to utilize a newer platform and rewritten so that it is more responsive and user friendly and is able to manage the growing number of users. This initiative is unfunded and the timeline is FY20-22.

CWCB Grant Portal

The Colorado Water Conservation Board manages multiple high-dollar grant programs (12) and one loan program for the state. CWCB is exploring usable, clear, and comprehensive online grant management system solutions that will help streamline and simplify the application process (reduce time and paperwork burden) for grant-seekers and grand-managers. The goal is to introduce consistency (requirements, communication, branding) among grant programs, facilitate clear and straightforward communication (automated workflows, emails, notifications) on process timelines, and generate analytics and reports. This is a fully funded initiative and the timeline is FY 19-21

Colorado Hazard Mapping & Risk Map Portal

The Colorado Water Conservation Board is working to transition the Hazard Mapping portal from a consultant's servers to OIT. In addition, OIT GIS staff are working to setup a LiDAR storage and dissemination portal for the state's LiDAR assets. This project is fully funded and the timeline is FY 19-20.

CPW Fort Collins Office Relocation

CPW is looking to relocate the Fort Collins office which will house up to 150 staff and volunteers. This will include offices for biologists, wildlife officers, park rangers, administrative staff, GIS staff, and aquatics lab and maintenance shop. This initiative is fully funded and the timeline is FY20-23.

CWCB HB 1051 (Municipal Reporting) Database

The Colorado Water Conservation Board will rebuild the HB-1051 database to better track municipal water use, enhance the customer experience for reporting and better allow CWCB to export critical data that is critical to state water supply planning. This initiative is fully funded and the timeline is FY 19-20.

CWCB Identified Projects and Processes Database (Project Database)

Colorado Water Conservation Board will develop a database to accurately track Water Plan projects, allow for new projects to be entered, editing old or shelved projects and establishing output needs (e.g., reports, number, etc). Tracking these IPPs is paramount to state legislative reporting on metrics and return on investment and are equally important to state planning efforts. This is a fully funded project and the timeline is FY19-21.

CWCB SWSI Data Visualization Tool

The Statewide Water Supply Initiative (SWSI) update includes multiple data sets, data analysis, and data outputs at different scales through which data scientists can help normalize, evaluate, and identify what stories need to be shown through the data in creative and, more importantly, interactive ways. This is a funded initiative and the timeline is FY 19-21.

DWR Mobile Surface Water Conditions App (What's The Flow?)

The DWR Mobile Surface Water Conditions app will allow the water users and the general public (i.e., recreational users) to view current flow conditions across the state of Colorado. Users will be able to customize the application to show a list of stations in which they are interested, visualize data over a specified period of time and set alert notifications for high and low flow levels. This initiative is unfunded and the timeline is FY20.

General Inventory Management Program (IMP) Improvements

Game species inventory data is stored in CPW's Inventory Management Program IMP Database. This application is in need of an update and modifications to meet current business needs and required reporting. This initiative is fully funded and the timeline is FY20.

HR Application Migrations

HRWorks 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 FY19-21.

Landowner Preference Program (LPP) Phase II

Develop an online application submission and application payment system for land owners. Develop an Area Wildlife Manager (AWM) Management screen to allow AWMs to manage their Game Management Units (GMU) to help their officers track audit/verification work. This initiative is unfunded and the timeline is FY20-21.

MyDWR Well Permitting Forms/ECommerce

Allows users to enter well application data directly into the Hydrobase Database while allowing state staff to approve the data entry. It will also allow users to make payments to the Division of Water Resources online. This initiative is unfunded and the timeline is FY21-22

OGCC Electronic Filing System for the Hearings Unit

The OGCC plans to submit a FY 19-20 supplemental request for the design and implementation of an electronic filing system for the Hearings Unit. The Hearings Unit includes an adjudicatory team comprised of hearing officers and administrative law judges. The hearing officers and administrative law judges review, process, prepare for hearings and recommend decisions on all hearings applications filed with the OGCC. This initiative is unfunded and the timeline is FY19-20.

Online Payment System

Several DNR Divisions are in need of an online payment system to process payments for various services they offer. This initiative is unfunded and the timeline is FY19-21.

OS Server Upgrade

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

Real Estate Inventory and Inspection System

CPW is in need of a new Real Estate Inventory and Stewardship system due to the insupportability of the current InspectThis system. InspectThis was never fully implemented, Alpine project was to develop the inspection portion of the application. Due to vendor issues, the system currently is unsupported and no further development can be made. Unsure of cost at this time but this initiative is expected to be funded and the timeline is FY20.

Survival Module Application

Data Collected from radio collars and telemetry are not currently centralized in any CPW system, which means many weeks of staff time are spent trying to collect the information every year from every Terrestrial biologist, compile it into a single format, and analyze it. This project will provide for data centralization and the ability for data to be entered in the exact same format by biologists. A reporting application would be programmed to report survival estimates of big game species at any point in time. This Is a new application that currently does not exist. The procurement of this application will begin in FY20. This initiative is fully funded and the timeline is FY20.

Trans6/AAHL/ADAMAS/Creel

The aquatic management programs used by CPW need to be replaced with a new system(s) to handle the needs of the aquatic section. CPW is currently analyzing the process needed for each of these components, determining where data is shared. It is projected that this project will begin late FY20 and procurement in FY21. Unsure of costs at this time, but expect this to be fully funded and the timeline is FY20.

Volunteer Database System

CPW is replacing their current volunteer tracking system with a more robust and capable application. The current plan is that this will be a vendor hosted, vendor supported solution and the procurement started in FY19. This initiative is fully funded and the timeline is FY20.

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 initiative is funded and the timeline is FY18-20.

DNR 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	$17551	$11647	$10740	$7401	$0
New Solutions	$10040	$12692	$18627	$12390	$0
TOTAL	$27,591	$24,339	$29,367	$19,791	$0

Mission Critical Technology Debt, New Solutions and Total
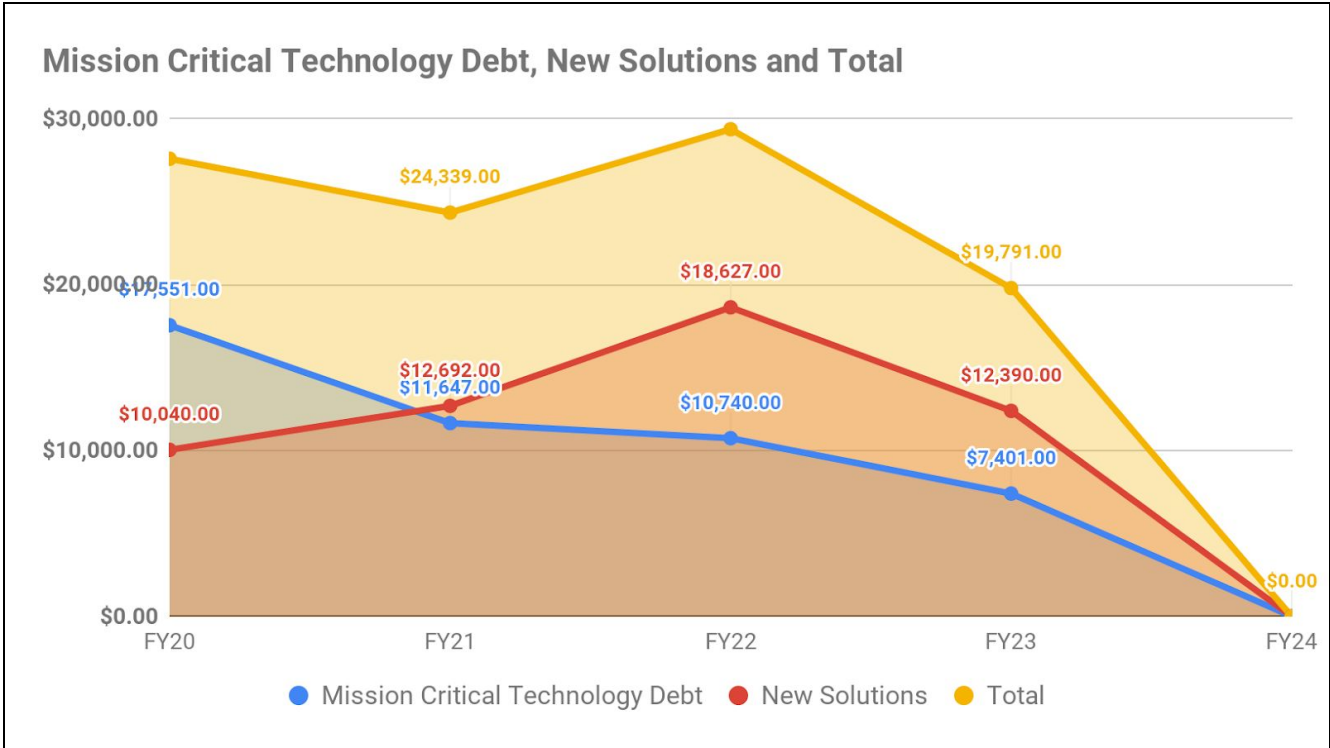
Appendix A: Enterprise Initiative Roadmap

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.

	FY20	FY21	FY22	FY23	FY24
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	███				

		FY20	FY21	FY22	FY23	FY24
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	███				

		FY20	FY21	FY22	FY23	FY24
	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 efforts and resources that surpass those needed if the initiatives are carried out proactively.

Application Lifecycle Management

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.

CORE NIST File Transfers

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 and has significant risks from process and personnel perspectives. Although meant to be a secure file transfer server, this asset is also used 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.

Clarity PPM (CA PPM or Clarity)

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.

Enterprise Infrastructure Refresh

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.

HRWorks

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.

Mainframe Decommission

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.

Network & Infrastructure Refreshes

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 to 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.

Next Generation Colorado

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.

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 and FY-21. This unfunded initiative affects all agencies and the timeline is FY19-21.

Telecom Enhancements (MIPC)

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.

Two-factor Authentication

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.

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 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.

Content Services Application Consolidation

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.

Content Services Enterprise Solution Deployment

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.

Crowdstrike Deployment

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.

Desktop Cloud Backup

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.

myColorado

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.

Optimization of Endpoint Security

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.

Privilege Access Management (PAM)

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. It also offers automatic discovery of systems with privileged access, automating the creation of role-based access, assisting in role definition/creation, and secure employee exit deprovisioning 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.

Salesforce Platform Org Strategy

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.

Salesforce Lightning Migration

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 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.

Salesforce Release & Environment Management

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.

Secure Office Print Ecosystem (SOPE)

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 partners 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.

Technology Accessibility and Mobile Assessment, Testing and Remediation

OIT has a statutory obligation to work with executive branch agencies to improve technology access to 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.

Cloud Access Security Broker

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.

Data and Access Governance

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.

East West Traffic Security

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.

Easy Secure Service Excellence - ESSE

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.

End-to-End Monitoring and Logging

This initiative will increase the annual budget for this particular activity, which enables OIT to have the management platform to automate, manage and patch more endpoints and at a faster pace. Technical training and an 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.

Identity Analytics and Risk Intelligence

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.

Server and Deskside Endpoint Management

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 an 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.

Smart Cities Exploration

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.

Appendix C: DNR Application Lifecycle Recommendations

The table and chart below show the applications used by DNR, 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:

- **Consolidate**: 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 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.
- **Replace**: Recommended when an application needs to be replaced with a newer application.
- **Re-Platform:** 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.
- **Sustain**: Recommended when an application is functioning properly and does not require a major upgrade or change.
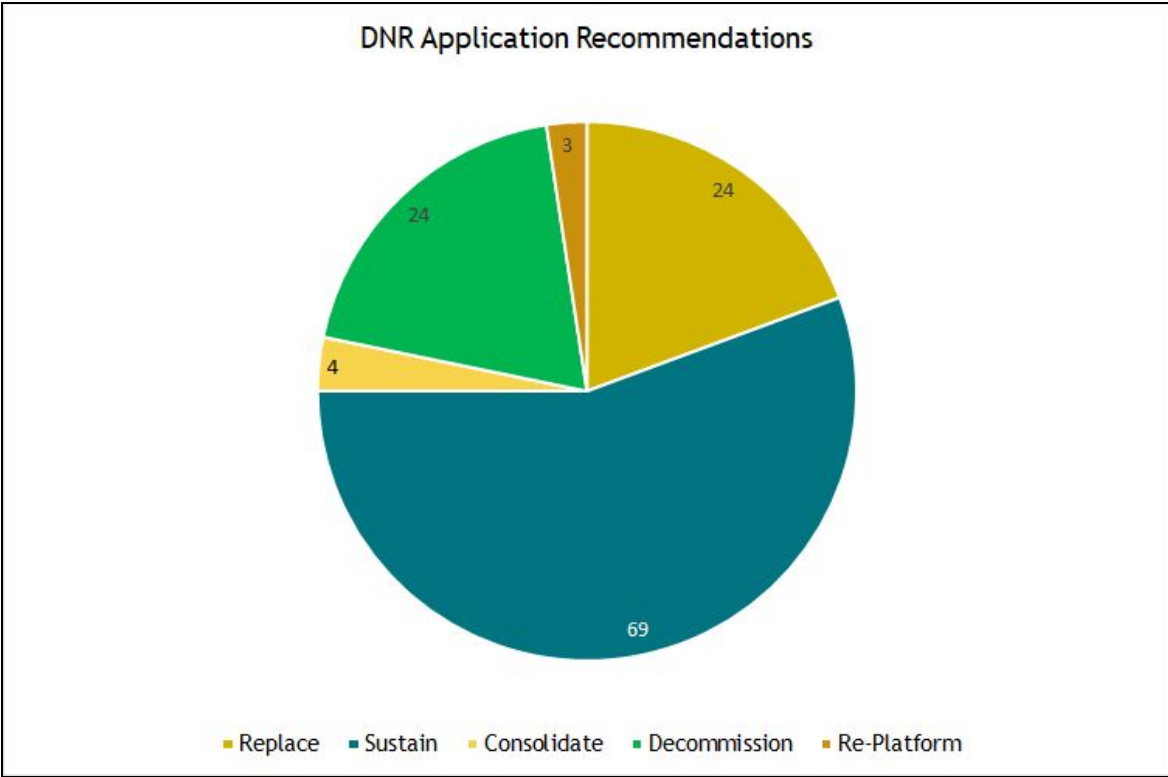
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Five-Year IT Roadmap