COMMONWEALTH of VIRGINIA

Department of Taxation

December 16, 2022

TO: The Honorable Barry D. Knight
Chairman, House Appropriations Committee

The Honorable Janet D. Howell
Co-Chair, Senate Finance and Appropriations Committee

The Honorable, George L. Barker
Co-Chair, Senate Finance and Appropriations Committee

During the 2022 Session, the General Assembly enacted Item 273 Paragraph D in the 2022 Appropriation Act directing the Department of Taxation to conduct an assessment of the Department's Integrated Revenue Management System (IRMS). Virginia Tax retained Gartner Inc. to complete the assessment which covers among other items: an overview of IRMS, a gap analysis of IRMS' business capability, functionality requested by internal and external business partners, a review of security limitations and risks, and issues affecting support of the current infrastructure. The report *Integrated Revenue Management System (IRMS) Modernization Assessment* is enclosed.

If you have any questions or comments regarding the enclosed report, please do not hesitate to contact me.

Sincerely,

Craig M. Burns
Tax Commissioner

C: The Honorable Stephen E. Cummings, Secretary of Finance
Ms. Anne Oman, Staff Director, House Appropriations Committee
Ms. April Kees, Staff Director, Senate Finance and Appropriations Committee

Virginia Department of Taxation

Integrated Revenue Management System (IRMS) Modernization Assessment

December 15, 2022

Engagement Number: 330075167

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Executive Summary

1.0 Executive Summary

Strategic Context

Fiscally, the Commonwealth of Virginia relies on timely and accurate tax collection, which is facilitated in large part by its information technology (IT) tax management system. The primary purpose of a modern integrated tax system is to enable revenue agencies to administer the full breadth of tax programs mandated by law, and to collect the revenues duly owed to the Commonwealth fairly and efficiently, all while keeping pace with the ever-changing digital customer-centric demands of Virginia taxpayers.

Virginia Tax's portfolio of current state technology solutions handling the day-to-day execution of key tax business processes is rapidly becoming obsolete, with its core tax system, Integrated Revenue Management System (IRMS), having been custom built and implemented over twenty years ago. The age and customization of the core IRMS technologies and related supporting applications has created functional and technological gaps that impact the Commonwealth's ability to efficiently perform tax operations and limits the agency's ability to make timely changes in response to legislative requests. System limitations have also resulted in increasing internal and external security risks and have put Virginia Tax's compliance with federal regulations for the handling of Federal Tax Information (FTI) in jeopardy in the near term. With an aging workforce and departure of key Virginia Tax personnel, the availability of knowledgeable and experienced personnel to manage and make changes within this complex solution landscape is quickly diminishing, posing an operational risk.

To address these challenges, item 273 of the 2022 Appropriation Act required, Virginia Tax to conduct a strategic planning exercise to identify and evaluate options for the replacement of IRMS. To support this effort, Virginia Tax engaged Gartner to assess the current state of the legacy systems, identify and evaluate approaches for full-scale modernization and develop a Transformation Roadmap to serve as the basis for Virginia Tax's system modernization program.

Current State Challenges and Drivers for Modernization

Virginia Tax's ability to effectively achieve its mandates is inhibited by the following challenges stemming from the agency's legacy technologies:

- **Aging and Complex Legacy Solutions:** Virginia Tax's core legacy system (IRMS) is comprised of 40+ interrelated applications, including multiple databases, with the core systems using custom-coding and built on technology approaching obsolescence.
- **Unsupported Business Capabilities:** Core business capabilities desired by internal and external stakeholders are not adequately supported by IRMS, and the resources required to make changes of the scale needed to meet identified needs are unavailable.
- **Increased Risks and Decreased Efficiency:** Critical functionality gaps, such as difficulty performing data analytics, inadequate workflow management and challenges introducing additional internal and security controls increase Virginia Tax's operational and security risks and decrease operational efficiency.
- **Inadequate Online Taxpayer Service Options:** Online account access for information and transaction processing are not consistently or adequately supported for business and individual taxpayers and tax preparers; and
- **Diminishing Institutional Knowledge:** IRMS' aging technology leaves Virginia Tax heavily reliant upon diminishing institutional staff knowledge, since IRMS is highly customized and the resources with the necessary skillsets are extremely limited in the market.

As part of the modernization planning process, Virginia Tax has identified the following key strategic goals for modernization of existing legacy systems:

- **Enhance Effectiveness:** Improve scalability of business solutions, inform managerial decision-making, improve ease of use and streamline the customer experience.
- **Optimize Productivity:** Reduce processing inefficiencies, reduce technical debt, improve processes and self-service tools and enhance the ability to query and analyze data.
- **Improve Agility:** Ensure the continued stability of tax revenue collection and management while being able to implement new tax types and programs and adjust existing processes timely in response to legislative requests, new policy initiatives and customer needs; and
- **Drive Compliance and Mitigate Risk:** Enhance compliance with the current and future Virginia and federal tax policy and legislation and reduce the tax gap; harden security and increase agility in handling of fraud and cybersecurity threats.

Recommendation Summary

Based on the analysis detailed in this report, Gartner recommends that Virginia Tax seek to replace the existing IRMS legacy integrated tax solution with a **single-vendor Commercial Off the Shelf (COTS) integrated tax system**, developed and implemented by a proven firm with deep tax knowledge and expertise. A COTS solution will yield the following key benefits:

- Configurable to meet a majority of Virginia Tax's needs and streamline operations with minimal customizations.
- Modern technology and architecture platform and principles, improving security posture and reducing the burden on Virginia Tax resources to maintain and support the agency's core solutions; and
- Scalability and flexibility required to support Virginia Tax's new and emerging needs.
- Cloud based COTS solution (particularly in the form of SaaS) reduces the operational burden of running and maintaining hardware and software, which frees up IT staff to focus on more valuable innovation and growth initiatives

Program Schedule and Budget Implications

The analysis shows that the recommended modernization strategy for Virginia Tax's will require **approximately 4 years to complete at a budget of approximately $89M**+/- 20% (range of $71-107M), inclusive of internal and external costs. The program will require effective and proactive planning, a robust program management and governance structure, strong executive level support and a focused change management strategy. Key elements and next steps for the modernization program are outlined in the Strategic Transformation Roadmap.

In calendar year 2023, Virginia Tax should begin defining clear functional and technical requirements for a modern COTS solution and develop a comprehensive request for proposal (RFP) to procure the best-fit Single Vendor COTS Solution and implementation partner.

Program Benefits

Virginia Tax's **system modernization will achieve not only significant cost savings but will realize positive financial benefits** once functionality begins to be implemented during the phased rollout, **culminating in a projected 200%+ cost to benefit ratio** at the end of the 10-year period. In addition to the quantifiable benefits, following are key anticipated qualitative benefits of the selected strategy:

- Deploy a reliable and flexible system able to meet Virginia Tax' future needs, leveraging the current and future benefits of COTS applications (e.g., implementation savings and future functionality enhancements);
- Support business process efficiency and flexibility through the automation of current manual processes.
- Reduce day-to-day administrative burden on Virginia Tax staff by simplifying the system landscape and streamlining data access.
- Enhance speed to production for business changes, though highly configurable and visible business rules that do not require complicated programming, which mitigates the risk of aging technology that is difficult to extend and expand.
- Improve taxpayer relationship management through the deployment of web-enabled taxpayer self service capabilities (e.g., fully integrated e-filing, tax payer account access and electronic bill presentment and payment);
- Enhance information management to support operational and policy decision making.
- Simplified management resulting from a single vendor and hosted service provided off-premises; and
- Mitigate the risk associated with loss of key support personnel.

Another factor that cannot be overlooked is that the **revenues collected by Virginia Tax are the lifeblood of the Commonwealth**, the costs incurred with the collection of those revenues impacts not only Virginia Tax but other programs in need of state funding to serve the citizens of Virginia. Now more than ever, it is imperative to establish an environment that enables optimal processing and collections of tax revenues.

Critical Success Factors

Virginia Tax recognizes the complexity associated with its replacement strategy and has identified the following critical success factors that will enable an effective implementation. These success factors are also considered in the Transformation Roadmap:

- Strong Executive Management commitment and championship throughout the project.
- Early involvement and buy-in from business and technical subject matter experts.
- Well-defined program governance structure and controls that enable informed and effective decisions.
- Clear communication and strong organizational change management.
- A realistic implementation schedule divided into small, manageable segments with clearly defined business benefits.
- An approved implementation budget with realistic investment expectations by internal and external stakeholders.
- Clearly articulated business and technical requirements and a process to define, manage and communicate changes over the life of the project; and
- Effective project management discipline, availability of internal technical expertise and strong management over external services providers.

Engagement Overview

2.0 Introduction

2.1 Background

Virginia Tax's current technology platform for taxation management consists of a homegrown platform called IRMS (Integrated Revenue Management System). IRMS is comprised of 40+ disparate technology systems that are integrated to exchange data and support critical business operations across departments within the agency, serving taxpayers, tax professionals, partners, localities and other state and federal agencies. IRMS was developed over twenty years ago and has become more and more difficult to support, with increasing maintenance and operational issues and staff retention/attrition challenges. IRMS issues primarily stem from the legacy programming language, custom development and complex integrations used in the majority of its subsystems, resulting in an inflexible tax system that is unable to move at the speed of business.

The 2022 Appropriations Act, Item 273, directed the study for potentially replacing IRMS with a new tax operating system, with the goals of improving service to individuals and businesses, reducing long-term processing costs, minimizing risk exposure, enhancing innovation and rapidly implementing legislative changes.

Virginia Tax contracted with Gartner to perform the study, due to the firm's independence and objectivity as well as its tax modernization expertise.

2.2 IRMS Overview

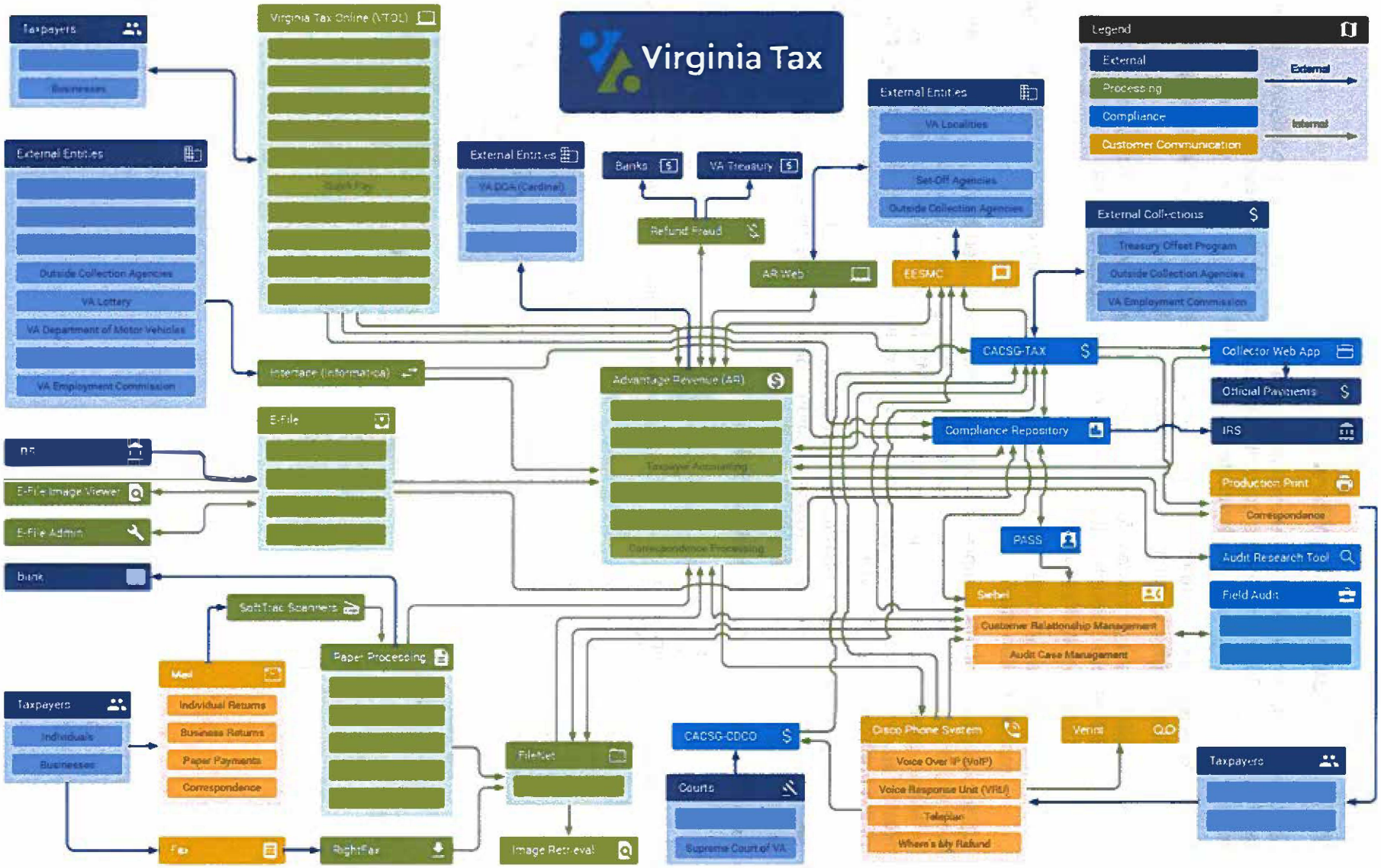
The existing Integrated Revenue Management System (IRMS) was built to replace the legacy STARS mainframe architecture, expanding on its capabilities while reducing manual and labor-intensive processes. Virginia was an early adopter of an integrated system, pioneering automation that was unseen in the mainframe era. Development began in the early 2000's and went live in stages, beginning in 2001 and completing in 2005. IRMS consists of a number of interdependent systems:

- AR (Advantage Revenue) is the core IRMS application and manages critical financial functions, including return processing, accounting and billing, while other business functions are managed individually by smaller applications; core ERP applications for Tax Accounting and Compliance are built in PowerBuilder technology
- VTOL (Virginia Tax Online), Interface (Informatica) and E-File applications manage the bulk of electronic tax intake
- SoftTrac Scanners, TACS (Total Automated Capture System), KFI (Key from Image), Remit and FaxCom manage paper processing; these applications funnel data into FileNet, the image storage center for all paper processed by Virginia Tax
- Tax information flows from intake channels to AR for financial processing, CACSG (Computer Assisted Collection System for Government) for collections and CR (Compliance Repository) for compliance data and audit
- Siebel supports the call centers, EESMC (External Entity Secure Messaging Center) for messaging and production print for correspondence
- IRMS has a complex architecture comprised of an array of discrete applications (40+) and hundreds of interfaces.
  - IRMS is implemented with rigid integration points which does not allow for a modularized system where components can be modified and replaced without complication

- No central data warehouse for tax data – many applications for collections, audit, and customer service need to replicate and aggregate data for specific use cases
- Almost all IRMS applications have integrations and dependencies with other applications; most connections route to primary processing and data sources of AR, FileNet, CR, CACSG, and Siebel
- IRMS has an extensive range of subcomponent applications in use, and a wide variety of enabling technologies in use

The IRMS Architecture, as shown in the following diagram, is composed of 40+ disparate systems of varying technology. These systems are integrated to exchange data and support business operations across the agency.

Figure 1. IRMS Architecture



2.3 Approach Overview

Gartner's IRMS modernization assessment approach was designed to ensure a comprehensive analysis of the Commonwealth's current pain points and future needs in the context of market offerings and Virginia Tax's modernization strategy. In order to do so, Gartner:

- Adapted the Gartner Application Solutioning and Business Capability Modeling methodologies to the IRMS modernization assessment.
- Applied best practices for gathering data from Virginia Tax's internal and external stakeholders through interviews, workshops, document and architecture reviews and current state analyses; and
- Considered Virginia Tax's ongoing work and historical assessments regarding the modernization effort.

Upon completion of this comprehensive assessment and alternatives analysis, Gartner identified and recommended a modernization solution that best positions the Commonwealth to achieve its strategic goals. Gartner then produced the IRMS Modernization Strategy and Transformation Roadmap, which provides an overview of activities and related durations throughout the phases of the implementation lifecycle.

The assessment activities Gartner performed are outlined in the figure below, and subsequent sections of this document will provide additional detail on the assessment activities performed at each stage as well as their results.

Figure 2. Gartner's Assessment Activities

4	5	6
Strategic Alternatives and Impact Analysis	**Transformation Roadmap**	**Final Report & Executive Briefing**

Gartner Activities

- Based on the Current State Assessment Report, identify strategic options for modernization (refactoring, replacement or combination); leverage historical alternative analysis as appropriate
- Evaluate all options using five key assessment categories: Business Value, Technical Value, Cost, Risk and Benefits realization timeframes
- Conduct landscape analysis of tax applications in other States; gather available high-level total cost of ownership (TCO) data
- Review draft options and impact analysis with stakeholders and build consensus on recommended target state modernization approach

Gartner Activities

- Based on the selected modernization approach, identify Process, Technology & Operating Model impacts/gaps
- Develop actionable Transformation Roadmap to prepare for, implement & transition to target state including project governance, data and change management
- Outline critical success factors and risks associated with the selected modernization approach, impacts & probability of occurrence and mitigation strategies
- Define high-level implementation timelines based on prioritized requirements and risk
- Update cost/benefit analysis between current state and recommended future state

Gartner Activities

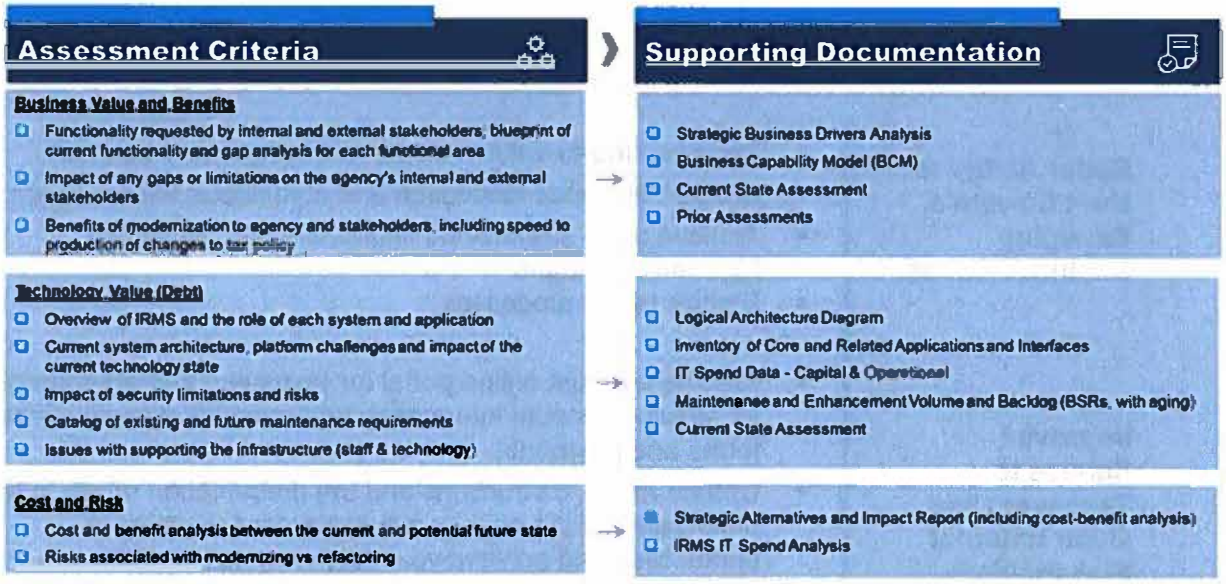
- Develop Final Summary Report as per the agreed upon template and table of contents to include:
  - Findings from Current State Assessment
  - Alternatives & Impact Analysis
  - Transformation Roadmap
  - Risks associated with modernization
  - Risks involved with failure to modernize
  - Probability of risk occurrence
  - Significance of risk impact
  - Mitigation strategies
  - Supporting documentation to request funding and business case for change
- Facilitate Executive Presentation with Virginia Tax Leadership

2.4 Assessment Criteria

The budget language requiring the study set forth specific criteria to be analyzed as part of the assessment. Gartner grouped these under three logical categories for the purpose of this assessment: Business Value and Benefits, Technology Value (Debt) and Cost and Risk.

The graphic in the figure below shows each of the Assessment Criteria and identifies the corollary documentation used as inputs to the study.

Figure 3. Assessment Criteria



Assessment results and recommendations were informed by existing Virginia Tax documentation (e.g., logical architecture diagram, maintenance and enhancement volume and backlog, IT spend data, etc.) and research and fact-finding efforts that resulted in the following Gartner deliverables:

- Strategic Business Drivers Analysis
- Business Capability Model (BCM)

- Current State Assessment
- Strategic Alternatives and Impact Report
- Transformation Roadmap

The findings were then validated and consolidated, culmination in this IRMS Modernization Assessment.

2.5 Modernization Goals and Strategic Business Drivers

A successful modernization strategy requires prioritization of key business drivers aligned with agency strategic goals while minimizing risk exposure.

Figure 4. Strategic Goals for a Modernized IRMS

The following business drivers represent the IRMS modernization goals expressed by Virginia Tax Leadership and external stakeholders:

Better Ability to Meet Current & Emerging Business Needs	▪ Improve time-to-value delivery of changes and services ▪ Support business innovation and continuous improvement ▪ Achieve more streamlined implementation of annual legislative changes ▪ Digitize paper processes
Improved Service to Taxpayers and Other External Stakeholders	▪ Provide a robust online portal for taxpayers and their agents; for viewing account information and submitting applications, forms and payments ▪ Update forms, instructions and the presentation of billing and other calculations so they are easier for taxpayers to understand and achieve voluntary compliance with ▪ Improve data access to Localities, in support of their service to taxpayers

Better Ability to Introduce Operational Efficiencies	▪ Streamline data & facilitate data analysis and reporting, especially for business users ▪ Focus audit and collections activities on higher yield cases, based on analytics performed by the system ▪ Improve task management and workflow capabilities ▪ Standardize processes and documents across tax types ▪ Provide a dashboard view of taxpayer account information and transactions
Streamlined Tax System Maintenance and Operations	▪ Reduce IT application maintenance costs ▪ Improve system stability ▪ Minimize complexity of the IT landscape ▪ Improve system support and maintenance by enabling speed, agility and intelligent automation
Reduced Operational Risk	▪ Enhance fraud prevention and internal controls capabilities ▪ Introduce best practices system and application security ▪ Improve system stability ▪ Attract and retain business and IT staff

Current State Assessment

3.0 Current State Assessment

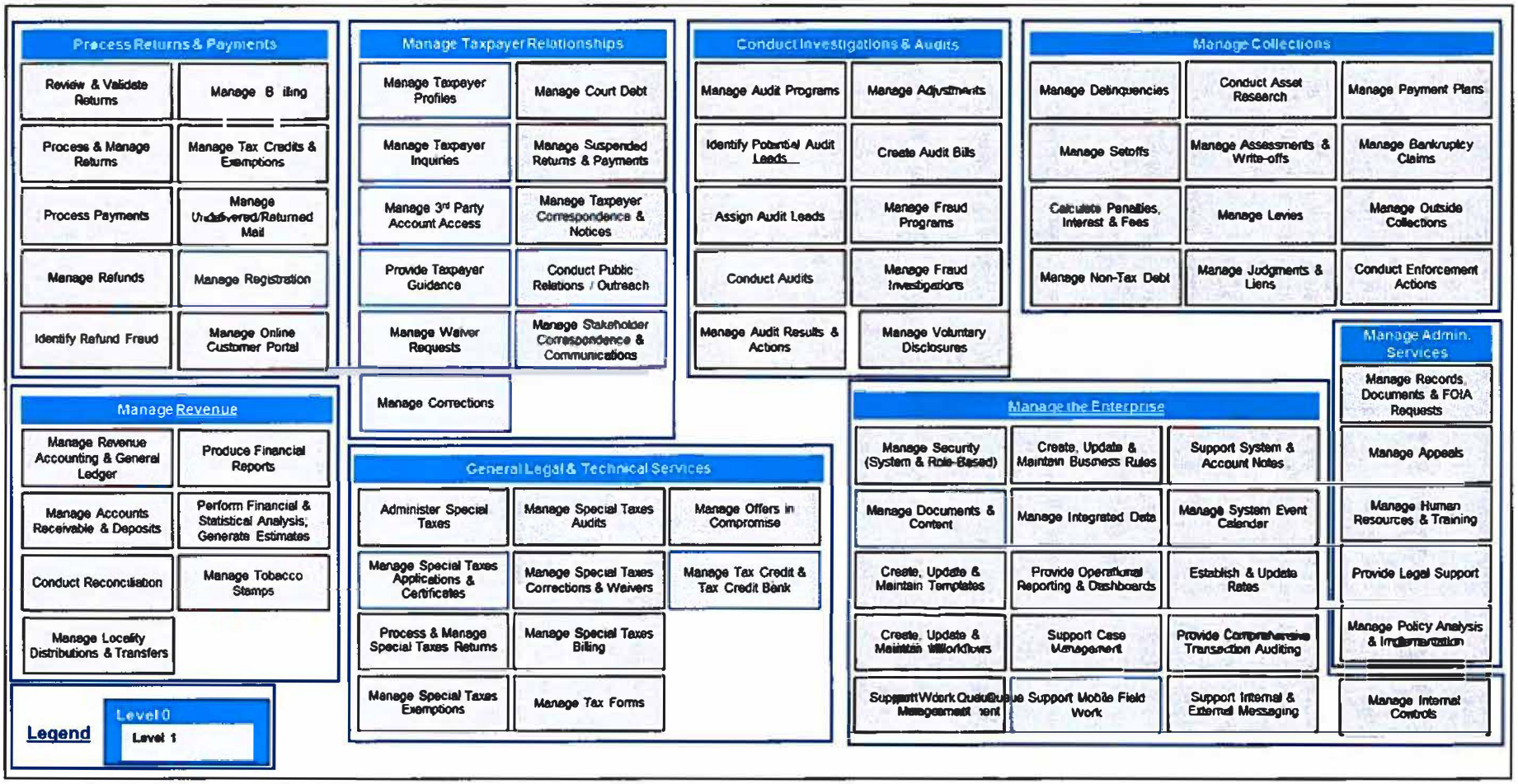
The Current State Assessment (CSA) serves as a foundation for subsequent IRMS Modernization Assessment components, including the Strategic Alternatives and Impact Report and the Transformation Roadmap. The CSA is based on the findings derived from a comprehensive discovery process that included Gartner's review of Virginia Tax's IRMS system-related documentation, leadership interviews, focused workshops with internal and external agency stakeholders and a review of historical modernization studies.

The IT Modernization Program includes the following key functional areas:

- **Process Returns & Payments** – Receipt, processing and initial validation of all tax returns and payments as well as billing, registration, mail handling. At Virginia Tax, also includes online portal management.
- **Manage Taxpayer & Stakeholder Relationships** – Taxpayer information assistance and self-service as well as internal and external communications.
- **Conduct Investigations & Audits** – Overall case management of investigations, including collections, audits, appeals and special investigations.
- **Manage Collections** – Scoring, tracking and collecting payments from delinquent and underpaid taxpayers.
- **Manage Revenue** – Performing financial reconciliation and related financial management functions. At Virginia Tax, also includes handling tobacco stamps.
- **General Legal & Technical Services** – Managing all aspects of Special Taxes processing as well as offers in compromise and tax credits.
- **Manage the Enterprise** – Supporting agency performance and information technology (data & analytics, content management, security, business rule & queue management, etc.).
- **Manage Administrative Services** – Administrative and strategic processes and functionality related to core commonwealth administrative processes (human resources, policy development, FOIA processing, etc.).

The Current State Assessment is graphically represented via the Business Capability Model (BCM), which identifies Virginia Tax's capability needs. The Virginia Tax BCM is shown in the figure below.

Figure 5. Gartner's Current State Assessment for the Virginia Tax BCM



3.1 Business Capability Findings and Implications

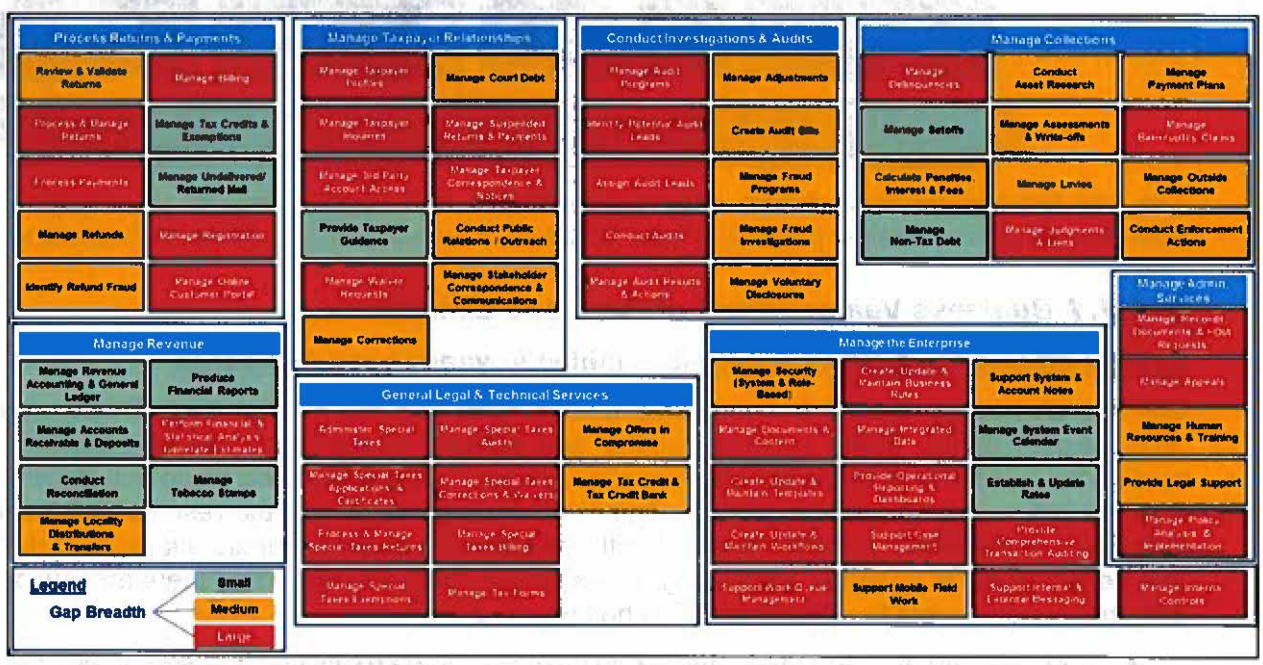
Once Gartner documented and validated Virginia Tax's core functional needs and their alignment via the Business Capability Model (BCM), Gartner then conducted a gap analysis of each Level-1 capability on the Virginia Tax Business Capability Model to assess the gap between current state IRMS capabilities and those deemed necessary by internal and external stakeholders. The analysis used the following scale to measure current state functional gaps:

Figure 6. Gartner's Gap Analysis Scale

Gap Analysis Scale	
Small	Current system capabilities satisfy most stakeholder needs, and the gaps have minimal to no material impact on day-to-day agency operations
Medium	Current system capabilities generally satisfy stakeholder needs and/or the gaps have a moderate impact on day-to-day agency operations
Large	Current system capabilities fail to satisfy a significant number of stakeholder needs and/or the gaps have a high impact on day-to-day agency operations

The BCM reflecting gap areas is shown below. Note that a larger version of the graphic is included in the BCM section of the appendices.

Figure 7. Gartner's BCM Gap Areas



The findings and implications of the gaps between current state IRMS capabilities and those deemed necessary by internal and external stakeholders are detailed in the following subsections. These gaps should be considered in the context of IRMS capabilities versus those offered by Modern COTS tax systems, which are built to align with current tax system and tax processing best practices, are highly configurable, and utilize common technologies, making it easier to make process and other changes and easier to hire the staff/contractors to make those changes.

3.1.1 Impact of Gaps and Limitations on Agency Internal and External Stakeholders

The findings on capability gaps have been organized into two categories – those impacting business value and those impacting technical value. Each of the categories has a number of major themes, as noted in the figure below:

Figure 8. Categories of Capability Gaps

The key findings for each theme have a substantive and ongoing impact on Virginia Tax's operations and are detailed in the Business Value and Technical Value sections that follow.

3.1.1.1 Business Value: Impact of Gaps and Limitations

System Inflexibility & Dated Capabilities Inhibit Revenue Loss Avoidance

Within a tax agency, there are a number of opportunities to avoid revenue loss. These are most often related to the ability process returns and refunds correctly and timely, the ability to continuously improve controls to prevent errors and avoid internal external fraud and the ability to improve processes and documentation. The IRMS findings below are the result of the technical inflexibility of the IRMS system combined with the lack of market resources available to develop and perform system changes. Essentially, changes are difficult to make and there are few people with the legacy skillset to make them. This has resulted in:

- High volume of suspended returns and payments that are difficult to research and resolve, resulting in incurred interest and unbilled revenues, due to filing and payment processing inefficiencies and complex data management.
- Challenges with building additional preventative controls into the system, presenting internal fraud risk; due to system inflexibility.
- Inconsistent and/or missing audit processes and documentation, resulting in high loss rate for appeals cases; due to insufficient case management and records management capabilities; and
- Management not being equipped with the data tools necessary to best focus staff efforts in revenue-impacting areas such as collections and audits; due to lack of automated task

management, poor case management and the system not providing predictive fraud/audit analytics (use of AI, machine learning, social analytics) or performance dashboards.

Absence of Robust Reporting & Analytics Inhibits Performance

Data and information are at the crux of strategic decision-making. Since IRMS consists of a number of inter-related applications (Advantage Revenue, CACSG, Siebel, etc.), taxpayer and other data resides in multiple databases. Pulling ad-hoc data reports and running queries is difficult and time-consuming for business staff without deep knowledge of the data and the reporting technology (SQL). This has resulted in:

- Business managers & staff being unable to run the ad-hoc reports and queries needed to perform either standard tax administration or strategic planning; they must instead request that OT pull data, which can take weeks; due to complex, technical SQL reporting and large volume of data across multiple data sources.
- Inability to rely on reported data without first performing extensive analysis and/or manual work and calculations; due to poorly or unrelated data across systems, conflicting data across systems, existence of duplicate accounts, inability to link accounts, etc.; and
- Localities having no real-time access and limited monthly access to Tax data they need for local planning; due to external state stakeholders having no system access to pull ad-hoc reports.

External Stakeholder Needs & Expectations Not Met by Current Operations

As a Tax agency, it is critical to facilitate transactions with external stakeholders to encourage timely, efficient and correct transactions. Tax agencies are now expected to have robust online portals to gather information, documents, applications and payments from taxpayers and those working on their behalf. The portals are also critical to ensuring complete and digestible account and transaction information is available to taxpayers. Tax agencies are also expected to standardize processes across tax types, to the extent possible; process consistency helps taxpayers better understand what is expected of them, making them more likely to comply with Tax policies. Virginia Tax has been unable to perform a wholesale modernization and improvement of its online portal capabilities and update its processes for consistency across tax types. This has resulted in:

- Inability to create a robust, centralized online portal for business & individual filing and payments across tax types, which has caused a disjointed customer experience (posing a challenge to voluntary compliance) and has also led to the Legislative request going unmet, due to technology and resource constraints.
- Maintenance of disparate processes across tax types, including some low-volume tax types still being paper-based, causing confusion and frustration for taxpayers and inefficiencies for the agency; due to technical resource constraints preventing low volume returns (estimated 47K out of 13M+) and the remaining 18 of 66 tax forms from being converted to electronic; and
- Inability for individual tax preparers to access client accounts to view and file/pay/inquire on their behalf, hindering voluntary compliance and causing frustration; has also led to the Legislative request for enhanced preparer access going unmet; due to technical resource constraints and a lack of inherent security permissions capabilities required to configure 3rd party access.

Persistent Operational Inefficiencies Due to System Limitations

Tax agencies benefit immensely from the ability to adjust the language, presentation of tax data, online processing requirements, level of automation, etc. in response to feedback from taxpayers,

communications staff and others. Simple adjustments can make a measurable impact in critical areas such as taxpayer voluntary compliance, Customer Service volume, etc. Because of the inflexibility of the legacy IRMS system, there is a backlog of requested language, process and other improvements. This has resulted in:

- Forms, instructions, bills and other documents that cannot be updated for plain language improvements and to present calculations and other information more clearly, resulting in ongoing taxpayer confusion/frustration, filing errors and an unnecessary burden on Customer Service; due to system complexity and lack of IT resources to make IRMS form, letter and other "enhancements."
- A disproportionate amount of business staff time being dedicated to manual work and workarounds rather than tax administration; due to inability to automate paper-based processes, lack of workflow capabilities, etc.
- Lack of readily accessible taxpayer data and the need to transact within more than one system, leading to significant inefficiencies, including tasks taking longer than they should and the need for rework; due to data housed in multiple applications and the lack of a dashboard view of the taxpayer; and
- A number of forms, applications, etc. that cannot be submitted online, resulting in labor-intensive and error-prone paper processing that is inconsistent across tax types; due to inability to update the system in line with modern electronic processing standards.

3.1.1.2 Technical Value: Impact of Gaps and Limitations

Significant Effort and Resources Required to Support and Maintain IRMS

IRMS is a complex, heavily interdependent system comprised of 40+ discrete applications, with core systems originally custom built in early 2000's, using near obsolete technology (PowerBuilder, COBOL, Visual Basic and ActiveX). Unlike modern COTS tax systems, which offer significant agility via configuration. IRMS technology requires coding rather than configuration for changes. This has resulted in:

- Technical teams spending considerable time and resources on maintenance and security upgrades; due to the technical debt around Virginia Tax's aging and complex IRMS environment.
- The myriad of point-to-point integrations causing data integrity challenges; due to the lack of a central data warehouse for all tax data, forcing applications to replicate and aggregate data for their specific use cases; almost every single application within IRMS has integrations and dependencies with other applications; and integrations are commonly done via database batch jobs along with some API interfaces for real time transactions; and
- Solving business needs becoming increasingly difficult; due to legacy & deprecated technology, architectural complexity, security limitations and developer resource limitations.

Loss of Institutional Knowledge & Inability to Close Talent Gap

IRMS technology is nearing obsolescence, and the people with experience with PowerBuilder, COBOL and other aging IRMS technologies are approaching or even past retirement age. Younger people in the job market are uninterested in learning an obsolete technology that is so dissimilar in look and feel from what they use on a daily basis. Additionally, Virginia Tax's pay and other benefits are not competitive when compared to the many local and remote private sector opportunities available to potential candidates. This has resulted in:

- Significant dependency on institutional knowledge of tenured staff, with many key staff having retired or approaching retirement (average age of Virginia Tax staff is approximately 50 years-old).
- Increasing difficulty attracting and retaining talent; Virginia Tax is experiencing dwindling responses to vacancy announcements, with critical open positions needing to be re-posted 3-4 times before a new hire is made; some positions remain open for several months; due to lack of interest in learning outdated technology and salary and telework limitations.
- Training of new hires on the many systems that comprise IRMS taking over a year, with a bulk of the staff training focused on "workarounds," since systems cannot be fixed due to cost, age and complexity; and
- Loss of institutional process and system knowledge becoming a crisis.

Note: While the Loss of Institutional Knowledge & Inability to Close Talent Gap is included within the Technical Value section, it applies equally to the Business Value area.

Major Security Risk due to Legacy Technology and Solution Architecture

The inherent security of legacy components is inferior to that of modern systems, and it is challenging and time-consuming to implement security enhancements. Some security-related reports are difficult to aggregate and translate into meaningful, consumable information, making it difficult for the security team to quickly identify risks and vulnerabilities and act upon them. There is increasing concern that IRMS will struggle to maintain compliance with IRS Publication 1075 requirements for tax system handling of Federal Tax Information (FTI) in the near future. Although Virginia Tax and VITA use modern technology and tools for broader security areas outside of IRMS, the IRMS landscape is large, as is the corresponding vulnerability gap. This has resulted in:

- Increased risk of internal and external accounts being compromised, due to highly insecure and deprecated encryption standard for passwords.
- Role-based access control and account management lacking the granularity necessary to ensure adequate segregation of duties; due to permissions being based on workgroups rather than roles.
- Inadequate detection or prevention of unauthorized access.
- Identity and access management (IAM) for AR Web failing to meet current security standards, introducing risk across the IRMS application landscape and making Virginia Tax vulnerable to breaches; due to manual IAM.
- Increased risk of security exposure from unencrypted and over logging of system activity in log files (including PII), ineffective analytics and no ability to detect or prevent malicious activity.
- Vulnerability to inappropriate access, requiring additional security measures, such as browser monitoring, which further exacerbate the risk due to unencrypted storage; due to AR's workstation-based configuration, with sensitive data stored on the workstations.
- Inability to perform standard security activities, including efficient event log analysis, taking advantage of full vulnerability scanning tools, implementing single sign on (SSO), etc.
- Difficult tradeoffs of security vs. legislative and business change requests; due to the difficult and time-consuming nature of making security changes; and

- Making IRS Publication 1075 compliance difficult in areas such as access management, data flagging (FTI) and enforcing least privilege.

Rigid, Aging and Complex System Prevents Rapid Deployment of Change

IRMS is a custom-built, complex and highly inter-dependent system that is over 20 years-old. It is extremely difficult and time-consuming to make, test and deploy changes, especially given the limited market resources with knowledge of the aging system. This has resulted in:

- The majority of taxpayer and agency-requested enhancements being unmet, with 65% of technical debt aged 1+ years and 37% aged 2+ years; because IRMS support is primarily dedicated to legislative & annual changes and critical defects;
- Responses to legislative requests taking significantly longer than in other states, with every update having potential impacts to integrated applications; due to legacy technology requiring significant development, integration and regression testing;
- Inability to deploy automation techniques, inconsistent and manual deployment procedures and time-consuming and arduous testing, which is predominantly manual; due to legacy, custom technology prolonging development cycles; and
- Extensive use of workarounds to meet business needs, which further exacerbates the complexity of future changes.

Extensive Modernization Necessary to Avoid Risk of Failure

As stated previously, IRMS is a custom-built, aging system that is difficult to change, with some desired changes nearly impossible, given the technology and support resource constraints. Given these constraints, focus and attention are necessarily dedicated to legislative mandates, such as annual changes, and resolution of critical issues. Which leaves little to no bandwidth for proactively maintaining system health and stability. This has resulted in:

- Technical debt and defect/enhancement backlog that cannot be resolved for the primary applications comprising IRMS (i.e., AR, CACSG and PASS), given the outdated technology and talent constraints.
- IRMS experiencing increasing levels of performance degradation during times of high activity and/or large data volumes (and failure to enforce data retention requirements), and IRMS being exposed to incremental points of failure, frequent bugs & issues and downtime to implement fixes and upgrades; due to reliability and stability issues stemming from ever-increasing technical debt.
- Virginia Tax being hindered in carrying out its mission largely, which they've only been able to continue carrying out because of the exceptional staff effort to maintain current systems and perform highly manual, labor-intensive workarounds; and
- Tax system technology reaching a point where there is a high risk of a major operational limitation or security failure; without a major modernization or complete replacement Virginia Tax will face continuing struggles to maintain sufficient operations and will remain non-compliant with the Commonwealth's cloud-ready mandate.

3.1.2 Functionality Requested by Internal and External Stakeholders

3.1.2.1 Functionality Requested by Internal Stakeholders

The following functionality was specifically requested by Virginia Tax staff during leadership interviews and stakeholder workshops:

- Fully integrated system with **end-to-end modern capabilities** (not an update to IRMS)

- **Comprehensive view of taxpayer accounts**, including electronic document access (returns, correspondence, etc.)
- Integrated **case management within the tax system**
- **Advanced workflow** capabilities, enabling efficient and consistent processing
- Standard **work queue functionality and management dashboards**, in support of task assignment and management and staff productivity analysis
- Robust **self-service reporting** for all staff, in support of operational analysis and decision-making
- **Digitization of tax documents** for all tax types to facilitate research, especially across departments
- Better **integrated filing and remittance capabilities**, to minimize suspended payments and returns and related lost revenues/excess interest payments
- **Improved data quality and access** via enhanced data capture, account linkage and validations
- Enhanced **online filing and payment capabilities** within a single portal, including for miscellaneous taxes, liens and bankruptcies
- **User-friendly**, **modern system** that enables staff to focus on business and customer needs rather than IT workarounds
- Reasonable **ability to implement fixes, process changes and perform continuous improvements**, enabled by a more configurable system and adequate IT support
- Integrated **system that eliminates data inconsistencies** resulting from maintaining the same data elements across multiple applications (and databases)
- Improved external **user authentication** (taxpayers, tax preparers, locality staff, etc.) online and when calling the Contact Center
- Better **system performance**, especially during peak volume periods (around tax deadlines, during large bill runs, etc.)
- Modern **customer-facing portal** with an **intuitive user interface** and a faster, easier process for **updating the portal** in response to customer feedback and in line with other messaging channels
- Increased use of **plain language and straightforward presentation** on bills, returns, notices, letters, etc., in support of voluntary compliance
- Add **reporting and provide analysis of results and performance for Compliance programs**; results would include assessments, collections and productivity by program and unit or area; collection/assessments ratios, time to collect by program, write-off and discharge data, etc.
- More **robust Refund Fraud predictive analytics and modeling** (e.g., ability to easily add & modify models, measure results by model, quantify incoming correspondence by age & model, etc.)
- Advanced **Compliance productivity tracking and reporting** (e.g., employee time tracking and system access, case inventory by age and program, etc.)
- Retain the **ability to access data quickly** for staff who rely on SQLs to query data on the fly
- Well-defined **functionality for authorizing and removing access**

- Streamlined and **automated process to create desk audit cases** by auditor/examiner, program, and year

3.1.2.2 Functionality Requested by External Stakeholders - Commissioners of the Revenue Representatives

The following functionality was specifically requested by Virginia Commissioners of the Revenue Representatives during a stakeholder workshop:

- Improved **system access for Locality users**, including additional logins and full search and other basic capabilities, so designated staff in counties, cities and towns can better access data in support of local constituents and Virginia Tax (e.g., if Localities have the ability to query an offline copy of the Sales & Use Tax database, they can report anomalies to TAX)
- Increased and more **real-time access to actual sales and use tax and other data and reports** for Locality users, in support of their budget and planning needs
- Ability for Locality users to **pull their own reports** throughout the year
- **Geographic Information System (GIS) integration** for improved field audits, more accurate business location verification for sales and use tax transaction locations, etc.
- Improved **Locality integration into the Customer Service process**, including view-only access to account notes, so they can answer basic questions and easily transfer constituents to Virginia Tax, when appropriate
- Better **access to corporate tax account information** in support of local audits (part-year returns contain move-in and move-out dates used to determine tax liability; customer contact information, if made available, increases the viability of audit assessments)
- **Insight into large refund claims** under consideration (those that would have a material impact on their local budgets) and timely notification of the approval of such claims
- **Electronic process for** Locality sales tax revenue transfer **request and approval**
- **Remote access** capabilities in the event of a situation that would invoke the Continuity of Operations Plan

3.1.2.3 Functionality Requested by External Stakeholders - Tax Professionals

The following functionality was specifically requested by Virginia Tax Professionals during their meeting with Virginia Tax:

- More **logical, straightforward instructions and processes** for making online payments for Individuals
- **Timely response** to correspondence
- Updated **e-signature capabilities** for online processing
- **Straightforward, detailed presentation of financials** on bills and other notices (e.g., penalty and interest rates, calculations, application of payments against a tax year, payment receipt date, etc.)
- **Simpler refund verification process** and **faster release of refunds** after verification is complete, including the ability to check the refund status
- **Transparent and streamlined audit process** for withholding audits
- Forms updates to **reduce the need for manual keying of data**

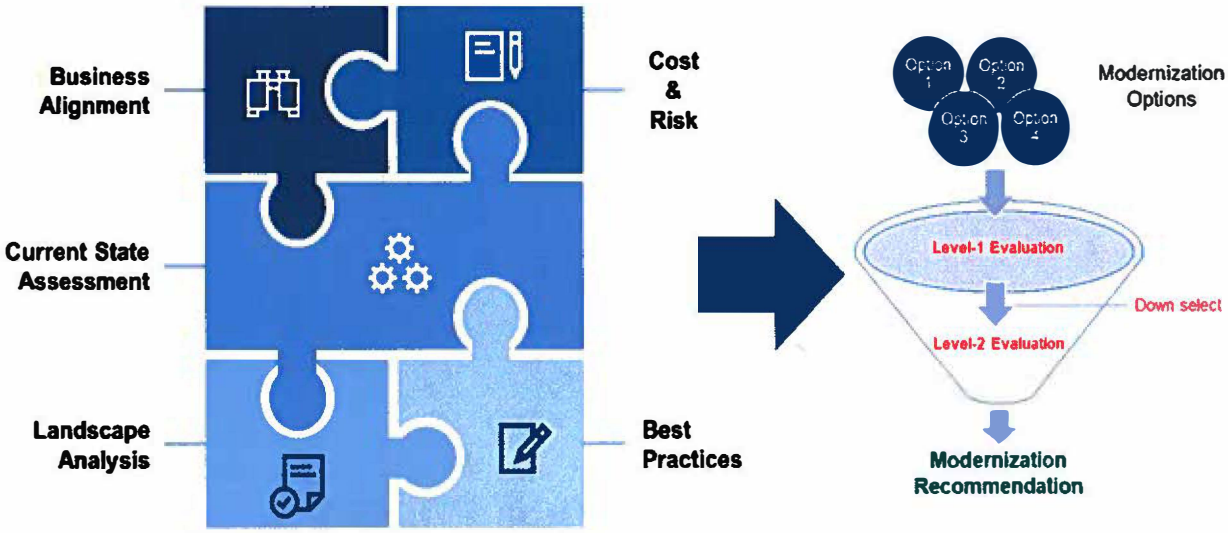
Strategic Analysis & Impact

4.0 Strategic Alternatives and Impact Analysis

4.1 Modernization Alternatives Analysis

Based on business and technical findings from the current state assessment as well as agency performance criteria, best practices and business alignment, potential solution options were identified and evaluated. This process was further informed by conducting a landscape analysis of other states that have recently completed or are in the process of completing modernization of their integrated tax solution.

Figure 9. Modernization Alternatives Analysis



Four solution options were considered: Custom Solution, Single COTS Solution, Best of Breed Solution and Refactor Legacy Components Solution. Each solution is described in the following section.

4.1.1 Modernization Solution Options

Option 1: Custom Solution

Leverage 3rd party design and development firm(s) to develop and deploy a customized tax solution that meets all of Virginia Tax's needs, using modern technologies and architectural principles. This custom solution would replace IRMS and deliver enhanced capabilities, while providing the functional agility to support new and emerging needs. This option allows for Virginia Tax's complete ownership of the solution source code, innovation cycles and delivery of value with reduced reliance on vendors over the long term. However, this option will require an extremely high level of effort to design, develop, deploy, and maintain. Additionally, 3rd party design firms may not have deep subject matter expertise in tax processing, likely resulting in a higher-than-normal reliance on Virginia Tax SMEs for an extended and sustained period. Such firms do not typically possess long-term maintenance and support capabilities, so post-implementation in-house support would be required.

Custom Solution components require moderate to complex integration across applications:

- Custom/homegrown Core Tax Processing Solution; and
- Other components for portal, collection, compliance and audit, CRM, and business intelligence, similar to the Best of Breed COTS Solution.

Option 2: Single COTS Solution

License and implement a single-vendor Commercial Off the Shelf (COTS) integrated tax system, developed by a proven firm with deep tax knowledge and expertise. This solution can be configured to meet a majority of Virginia Tax's needs with minimal customizations and would streamline operations, but it would require some level of business process changes to leverage the best practices built into the system. A COTS solution would use modern Cloud or Software as a Service (SaaS) technology and architecture principles that allow for supporting new and emerging needs. This option requires a lower effort to deploy and maintain, however, a single COTS tax solution may not have satisfactory levels of maturity/sophistication with regards to customer service, portal look and feel, data analytics, etc., and it may lack foundational elements of human-centric product design.

COTS Solution Components require simple integration across applications:

- Single architected Tax Solution, including remittance processing, collections, compliance & audit, E-File, CRM, online portal, and business intelligence capabilities. (e.g., FAST, RSI).
- Potentially augmented by business intelligence and predictive analytics solution (e.g., Azure Synapse etc. over the longer term); and
- Paper Processing and Customer Communications supporting infrastructure retained from current state, with enhancements.

Option 3: Best of Breed COTS Solution

License and implement a collection of COTS applications that are fit for purpose solutions for Core Tax Processing, Online Portal, Case Management, CRM, and Analytics. This option could be configured to meet a majority of Virginia Tax's needs with minimal customizations, but it would require business process changes to leverage the best practices of each of the proven fit-for-purpose applications. This solution would use modern Cloud or Software as a Service (SaaS) technology and architecture principles and allow for supporting new and emerging needs; however, the multi-system landscape would necessitate an enterprise integration platform, increasing the complexity of implementation while limiting overall functional agility. This option would require an increased level of effort to deploy and maintain, and it introduces complexities in terms of contract planning, vendor performance management and contract oversight.

Best of Breed Solution Components require moderate integration across applications:

- Core Tax Solution (e.g., FAST, RSI).
- Online Portal for Taxpayers, Businesses & Tax Preparers (e.g., Microsoft Dynamics).
- CRM Solution (e.g., Salesforce, ServiceNow, PEGA etc.).
- Case Management Solutions for collections, compliance, and audit (e.g., PEGA, Appian, Microsoft, etc.).
- Enhanced Business Intelligence and Predictive Analytics Solution (e.g., Azure Synapse, etc.); and
- E-file, Paper Processing and Customer Communications supporting infrastructure retained from current state, with enhancements.

Option 4: Refactor Legacy Components (Minimal Enhancements)

Leverage a third-party service provider to restructure and re-code the core legacy applications (CACSG and AR) and move the code to a modern technology platform. This solution requires in-depth knowledge of the core IRMS code-base to isolate the components for modernization into an integrated solution and reduce architectural rigidity. This option is likely to face proprietary issues with re-use of existing code-base, which may prevent "porting" code to a modern language and/or technology. This option would fail to meet the majority of Virginia Tax's needs, since refactoring alone would not close existing functional gaps nor remediate technology risks. The solution would have low agility, due to the complexities of updating and implementing changes in this environment. This is the lowest-rated solution option.

Refactored Solution components would continue to use the existing complex integration across applications:

- Refactored Tax Solution (AR)
- Refactored collections, audit and compliance solution (CACSG)
- Upgraded CRM solution (Siebel); and
- E-file, Paper Processing and Customer Communications infrastructure retained from current state, with enhancements.

Potential solution architecture components for the four modernizations options are shown in the figure below.

Note: Specific companies and applications are examples for illustrative purposes only and are not intended as solution recommendations. There are multiple solution options for each function that may meet Virginia Tax's needs.

Figure 10. Solution Architecture Components for the Four Modernizations Options

Key Functions	1. Custom Solution	2. Single COTS Solution	3. Best-of-Breed COTS Solution	4. Refactor Legacy Components (Minimal Enhancements)
Core Tax Processing	Custom	FAST/RSI	FAST/RSI	Refactored
Online Portal	MS Dynamics	FAST/RSI	MS Dynamics	Refactored
CRM	Salesforce	FAST/RSI	Salesforce	Refactored
Case Management (includes collections, compliance & audit)	PEGA	FAST/RSI	PEGA	Refactored
Data & Analytics	Azure Synapse	FAST/RSI	Azure Synapse	Refactored
E-File	Existing	FAST/RSI	Existing	Existing
Paper Processing	Existing	Existing	Existing	Existing

4.1.2 Modernization Options Level-1 Evaluation

Based on the Level-1 Evaluation, Gartner determined that **Option 4: Refactor Legacy Components** is not a viable approach for modernization for the following reasons:

- Existing functional gaps would persist, so business and external stakeholder needs would continue to go unmet.
- Is high complexity, would take the longest to implement and is the highest cost solution.
- Relies heavily on resources with deep understanding of legacy technologies and existing IRMS custom code; this skillset is extremely limited in the marketplace.
- Potentially faces proprietary issues with re-use of the existing code-base; and
- Refactoring of legacy tax systems is counter to all industry trends.

Figure 11. Level-1 Evaluation

Criteria	1. Custom Solution	2. Single COTS Solution	3. Best-of-Breed COTS Solution	4. Refactor Legacy Components (Minimal Enhancements)
Business Alignment	*High*	*High*	*High*	*Low*
Industry Technology Adoption	*Medium*	*High*	*Medium-High*	*Low*
Execution Horizon	*Extended*	*Standard*	*Standard*	*Standard-Extended*
Cost of Ownership	*Medium-High* $$$	*Medium-Low* $	*Medium* $$	*High* $$$$
Overall Level-1 Evaluation	☑	☑	☑	☒

4.1.3 Modernization Options Level-2 Evaluation

The three remaining options were further evaluated using criteria collaboratively developed with Virginia Tax. The criteria were organized according to Business Value, Technology Value, Execution Risk and Cost. The Single COTS Solution met or exceeded the scores of the other two solutions across all criteria and received the highest aggregate score with the lowest cost.

Figure 12. Level-2 Evaluation

Assessment Area	1. Custom Solution	2. Single COTS Solution	3. Best-of-Breed COTS Solution
Business Value	3.5	3.5	2.8
Technology Value	2.2	3.8	2.8
Execution Risk (● = Most Aligned)	1.3	3.0	2.0
Cost of Ownership (High Level 10-Year TCO)	$157M - $235M	$105M - $158M	$138M - $207M
Overall Level-2 Evaluation	7.0	10.3 ☑	7.6
Summary Evaluation	Most customized approach, with the highest degree of control and ownership, but the costliest and most complex and time-consuming to implement and maintain. Requires specialized, hard to obtain resources for development and implementation. Introduces implementation and ongoing operational challenges in terms of system interoperability and maintenance, agility, usability and vendor management.	Least costly, lowest risk approach, offering the highest overall business and technical benefits with the shortest implementation timeframe. Simplified architecture and minimal customization, makes it easier to maintain and more agile over time (faster time-to-production for changes). Because the solution relies on configuration rather than development, it requires Virginia Tax to reengineer some operational processes to adapt to software constraints.	Complex and costly approach that, while meeting specific business needs, introduces implementation and ongoing operational challenges in terms of system interoperability and maintenance, agility, usability and vendor management. Because the core system components are COTS, including a COTS tax processing solution, this option requires Virginia Tax to reengineer some operational processes to adapt to software constraints.

Legend

1 Low alignment
2 Medium alignment
3 High alignment
4 Full alignment

4.1.3.1 Level-2 Evaluation Summary

The assessment criteria and evaluation ratings are summarized below.

Figure 13. Level-2 Evaluation Summary

Assessment Area	Criteria Description	Custom Solution	Single COTS Solution	Best-of-Breed COTS Solution
Business Value				
Customer Centric / Self-Service	Degree to which the solution functionality meets internal & external stakeholder needs, including the ability to integrate more digital and self-service opportunities			
Future Needs and Functional Agility	Level of flexibility of the solution to support evolving legislative requirements; configurability to support operational optimization (e.g., workflows, validations and other enhancements); time-to-production of changes and services			
Operational Efficiency	Degree to which the solution addresses current functional and operational inefficiencies			
Reporting and Analytics	Quality of standard and predictive analytics and the degree to which reporting tools available to business users enable operational performance analysis and improvements			
Technology Value				
Architectural Complexity	Complexity of technical architecture, integrations and data sources			
Usability	Degree of intuitiveness of the system interface for internal and external stakeholders			
Security, Data and Privacy	Ability of the solution to meet security, privacy and data protection needs			
Effort to Maintain	Effort and resources required to support and maintain the target state solution			
Resiliency	Ability of the solution to deliver enhanced operational stability and availability			
Alignment to Market Trends	Alignment of the solution approach with broader direction of other states. *Where the market is going from a vendor perspective and a client perspective*			
Execution Risk				
Vendor Management Complexity	The degree to which the solution option mitigates risks associated with coordination across multiple vendors, during both system implementation and subsequent operations			
Time to Implement (Phased Approach)	The time it will take to procure, plan for and execute the implementation of all capabilities			
Change Management	The degree of change and complexity of transitioning from current state to target state			
Cost				
Cost of Ownership (High Level 10-year TCO)	Initial cost of implementation and on-going costs to maintain and support the solution	$157M - $235M	$105M - $158M	$138M - $207M

4.1.3.2 Level-2 Evaluation – Business Value Detail

Figure 14. Customer Centric/Self-Service

Criteria Description		
Degree to which the solution functionality meets internal & external stakeholder needs, including the ability to integrate more digital and self-service opportunities.		
Custom Solution	Single COTS Solution	Best-of-Breed COTS Solution
• A custom solution provides maximum opportunity to meet internal and external stakeholder needs related to the core tax processing system, and it does so without compromising functionality, without requiring the agency to adjust business processes to fit COTS solution constraints and without the need to negotiate with the COTS vendor to make necessary customizations • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• Single vendor COTS solutions include standard configurability for updating letters, forms, notices, etc. in response to customer feedback • COTS offerings include a central online portal for account owner and 3rd party filing, payment, account viewing, document access and customer service functions • COTS solutions will support standardization of disparate processes across tax types, making transaction processing more consistent and straightforward • Dashboard view of customer account and related documents facilitates staff analysis of accounts when working cases, etc. • COTS vendors in the market deliver a user interface and experience similar to those provided by modern business and personal applications, but the flexibility of the look and feel and overall usability is limited to specific vendor offerings	• At the center of a Best-of-Breed solution would be a core tax processing system, which would provide the standard configurability for updating letters, forms, notices, etc. in response to customer feedback • A Best-of-Breed solution would provide an online portal for account owner and 3rd party filing, payment, account viewing, document access and customer service functions, this solution should offer the best UI • The integration of multiple applications within this solution would make standardization of processes difficult • A dashboard view of customer accounts and related documents will be more difficult to achieve given the integration complexities of this solution • Solutions with a multiple interfaces are more difficult for internal users to learn and navigate

Figure 15. Future Needs & Functional Agility

Criteria Description		
Level of flexibility of the solution to support evolving legislative requirements; configurability to support operational optimization (e.g., workflows, validations and other enhancements); time-to-production of changes and services.		
Custom Solution	Single COTS Solution	Best-of-Breed COTS Solution
• A custom core tax system would provide maximum flexibility to support future enhancements and legislative needs but would require a complex build that requires ongoing custom coding (rather than configuration) for updates, upgrades, enhancements and other changes; such coding is time consuming and requires significant testing which increases the time to production • This solution would also significantly enhance workflow and validation capabilities, but adjusting processes would be difficult and time consuming • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• Leading COTS tax systems are highly configurable and less dependent on external systems, supporting a quick time-to-production for changes but it would require Virginia Tax to adapt some of its processes with the COTS capabilities and/or collaborate with the COTS vendor for adding features to the product roadmap. • COTS solutions offer flexible workflow and validation capabilities • Vendor/partner resources offer deep tax and revenue domain expertise and experience	• Best-of-Breed solutions are generally highly configurable, since vendors aim to serve the broadest customer base, so they allow high flexibility to meet Virginia customer-specific needs • These solutions have multiple interdependencies, which increases the level of effort and time-to-production for system changes • Best-of-Breed solutions are challenging to maintain and upgrade due to multiple integration points and architectural complexity • These solutions generally offer workflow and validation capabilities, although adjusting processes across systems is more complex and will have constraints • Vendor/partner resources may not have strong knowledge of the tax and revenue domain

Figure 16. Operational Efficiency

Criteria Description		
Degree to which the solution addresses current functional and operational inefficiencies.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• Majority of current functional and operational inefficiencies are due to the legacy technology and the rigidity of the solution architecture itself; as long as a custom solution is grounded in best practices, supports architecture principles such as SOA, microservices, etc. and allows for functional agility, a custom solution can fully address current inefficiencies • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• Leading COTS tax systems are highly configurable to remediate functional and operational inefficiencies • COTS solutions offer inherent workflow, validation and automation capabilities to replace manual processes • This solution will enable Tax Processing best practices and meet technology industry standards, but it will require agencies to adapt their operations to leverage the out-of-the-box functionality of the solution	• Leveraging a leading COTS solution for core tax processing will remediate many of the functional and operational inefficiencies. • Since Best-of-Breed solutions incorporate multiple applications/systems/platforms, then workflows, validation and automation are more complex than in a single-system environment, and some process integration capabilities may be limited • Best-of-Breed solutions offer the highest degree of flexibility in terms of tailoring processes to optimize functionality and operations, although the complexity of end-to-end process integration and architecture can offset efficiency gains

Figure 17. Reporting & Analytics

Criteria Description		
Quality of standard and predictive analytics and the degree to which reporting tools available to business users enable operational performance analysis and improvements.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• The observations would be similar to a Best-of-Breed solution	• COTS solutions provide moderately strong reporting and analytics in support of strategic analysis, decision-making and prioritization; this solution will provide relatively limited cross-system analytic capabilities and could have limited flexibility • Inherent system capabilities will support majority of the agency's needs in terms of predictive analytics/case selection within the solution, some augmented predictive analytics capability may be desired/needed (outside of the solution offerings) • This solution will provide dashboard capabilities to enable managers to monitor and direct the work in their areas relatively easily • A single COTS solution's centralized data management presents a lower risk of data inconsistencies and simplifies data management	• Best-of-Breed solutions will employ strong reporting and analytics tools that can be leveraged across systems in support of strategic analysis, decision-making and prioritization • This option would include strong predictive analytics capabilities, including solutions such as AI, machine learning, social media analytics, etc., coupled with power visualization tools • This solution will provide dashboard capabilities to enable managers to monitor and direct the work in their areas relatively easily • The inherent data complexities of multi-system environments present data integrity risk and require a higher data management level of effort • A thoughtful activity to capture data definitions, structures and relationships, as well as policies and governance of how data should be managed, maintained, accessed and shared would be required

4.1.3.3 Level-2 Evaluation – Technology Value Detail

Figure 18. Architectural Complexity

Criteria Description		
Complexity of technical architecture, integrations, data sources, and support for future composability.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• Developing a custom core tax processing solution would need to be based on a design that is grounded in best practices, employs security and data integrity standards and supports architecture principles such as SOA, microservices, etc.; this will require significant architectural complexity • Virginia Tax will need to manage all technical architecture, scalability, high availability, disaster recovery and timely updates hardware to leverage efficiencies • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• Single vendor COTS solutions will enable a standardized and simplified technology platform across Virginia Tax's functional areas • This solution consolidates data across functions, simplifying the establishment of each data field source of record, cross-system data update rules, etc., while minimizing data integrity risk • Vendors manage all technical architecture, which is included in subscription/license fees, and which offers on-demand scalability, high availability, disaster recovery and continuous hardware updates to leverage efficiencies	• Leveraging a leading COTS solution will enable a standardized and simplified technology platform for core tax processing; however, incorporating multiple applications/systems/platforms for the other components will introduce overall architectural complexity • This solution requires data integration across multiple source systems, with challenges in terms of establishing each data field source of record, cross-system data update rules, etc., presenting a data integrity risk • This solution requires an enterprise integration platform to more seamlessly integrate across the solution components • Vendors manage all technical architecture, which is included in subscription/license fees, and which offers on-demand scalability, high availability, disaster recovery and continuous hardware updates to leverage efficiencies

Figure 19. Usability

Criteria Description		
Degree of intuitiveness of the system interface for internal and external stakeholders.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• The observations would be similar to a Best-of-Breed solution	• COTS vendors in the market deliver a user interface and user experience similar to those provided by other modern business and personal applications, but the flexibility of the look and feel and overall usability is limited to specific vendor offerings • A single vendor solution will offer a standardized interface across functions and a single logon, simplifying the customer and internal user experience and minimizing initial and ongoing training needs	• Best-of-Breed solutions have a high likelihood of each component offering optimal usability, in line with the best modern business and personal applications • This solution would result in a tax system with differing user interfaces across functional areas and will potentially require multiple logons, especially for internal users, which increases initial and ongoing training needs

Figure 20. Security, Data & Privacy

Criteria Description		
Ability of the solution to meet security, privacy, and data protection needs.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• The observations would be similar to a Best-of-Breed solution	• A single vendor COTS solution would offer modernized security and data protection that meet Virginia Tax's security, privacy and data protection needs and address current weaknesses • Market offerings are designed to handle federal tax information (FTI) and have demonstrated inherent system security compliant with IRS Publication 1075 • Market offerings are designed for configurable role-based access control (RBAC)	• A Best-of-Breed COTS solution would offer modernized security and data protection that meet Virginia Tax's security, privacy and data protection needs and address current weaknesses • Market offerings are designed for configurable role-based access control (RBAC) • Despite the COTS solutions meeting security standards, properly handling and storing Federal Tax Information (FTI) across systems not specifically built for tax agencies, will present challenges in achieving IRS Publication 1075 compliance

Figure 21. Effort to Maintain

Criteria Description		
Effort and resources required to support and maintain the target state solution.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• A custom build multi-system solution will require the highest level of effort to maintain • Virginia Tax will need to manage all technical architecture, scalability, high availability, disaster recovery and infrastructure planning for the custom core tax solution • Virginia Tax will need to plan and execute patches, fixes, upgrades and other changes for the custom core tax solution, which will require extensive development and regression testing as well as coordination across vendors and technologies • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• The single vendor COTS option requires the lowest effort to maintain due to a streamlined single product environment • Vendor manages all technical architecture, which is included in subscription/license fees, offer on demand scalability, high availability, disaster recovery and continuously update hardware to leverage efficiencies • With a single vendor COTS solution, planning and executing patches, fixes, upgrades and other changes is simpler than with other solutions • Although a single COTS solution provides a "single neck to choke" from a maintenance standpoint, it also involves a constrain driven by a single product roadmap and related timeline	• With a Best-of-Breed solution, planning and executing patches, fixes, upgrades and other changes will require coordination across vendors and technologies and will necessitate additional regression and other testing • Architectural complexity from multi-vendor solutions will require significantly more effort to maintain on a day-to-day basis compared to simplified single COTS solution • Best-of-Breed solutions inhibit agency IT management autonomy, since the agency will be dependent upon/constrained by multiple product roadmaps and related timelines

Figure 22. Resiliency

Criteria Description		
Ability of the solution to deliver enhanced operational stability and availability.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• Virginia Tax will need to plan and test the custom core tax solution's performance during high activity tax periods and ensure appropriate disaster preparedness • Virginia Tax will be responsible for executing patches, fixes, upgrades and other changes for the custom core tax solution to eliminate performance degradation and minimize technical debt • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• Leading Single Vendor COTS solutions are designed and time-tested for stability and availability during high activity tax periods as well as any disaster scenarios • Vendors maintain all technical infrastructure, which is included in subscription/license fees, and which offers on-demand scalability, high availability, disaster recovery and continuous hardware updates to leverage efficiencies, provides enhanced operational stability by eliminating performance degradation and technical debt • A Single Vendor COTS solution will have very few integrations with other applications, thereby reducing the operational failure points	• Leveraging a leading COTS solution for core tax processing will ensure stability and availability during high activity tax periods as well as any disaster scenarios • Vendors maintain all technical infrastructure, which is included in subscription/license fees, and which offers on-demand scalability, high availability, disaster recovery and continuous hardware updates to leverage efficiencies, provides enhanced operational stability by eliminating performance degradation and technical debt • With Best-of-Breed each product will provide enhanced operational stability and availability, however integration across the applications would need to be monitored more closely to ensure overall solution stability and availability

Figure 23. Alignment to Market Trends

Criteria Description		
Alignment of the solution approach with broader direction of other states. *Where the market is going from a vendor perspective and a client perspective.*		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• Custom solutions are no longer considered a viable option in the marketplace due to the costs, risks and inefficiencies; some jurisdictions consider re-factoring, but that is not an option for Virginia Tax due to the age and types of technology employed by IRMS	• Single Vendor COTS tax systems represent the dominant market trend, nearly three-quarters of US states have implemented or are currently implementing a Single Vendor COTS system	• Modern Best-of-Breed solutions are uncommon—only one state (California) solely utilizes a modern multi-vendor solution • Most states that had previously implemented a Best-of-Breed solution have subsequently moved to Single Vendor COTS model to streamline costs and eliminate the complexities and constraints of a multi-system, multi-vendor environment

Note: Refer to Section 4.2 for the tax and revenue modernization landscape analysis and supporting evidence for the Alignment to Market Trends assessment

4.1.3.4 Level-2 Evaluation – Execution Risk Detail

Figure 24. Vendor Management Complexity

Criteria Description		
The degree to which the solution option mitigates risks associated with coordination across multiple vendors, during both system implementation and subsequent operations.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• Custom core tax solution will require heavy dependence on the professional services vendors during and after implementation phase • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• A Single Vendor COTS option will mean heavy vendor dependence once in production, thus minimizing agency leverage in negotiations • Risks associated with integrations are minimized due to a single vendor having control across the system • The vendor management model will be simplified from both the technical and contractual perspectives • SLA negotiations could prove challenging, since the vendor will typically have standard SLAs for all customers	• Vendor dependence exists, but a Best-of-Breed approach avoids concentration for such dependence with a single vendor • Risks associated with integration are more likely to fall on Virginia Tax as the 'broker' of information exchanges across different COTS vendors providing agency systems • Strong vendor and contract management capabilities are needed • SLA negotiations could prove challenging, since the vendors will typically have standard SLAs for all customers and because multi-vendor environments require OLAs, which are difficult to establish and enforce

Figure 25. Time to Implement

Criteria Description		
The time it will take to procure, plan for and execute the implementation of all capabilities.		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• A custom solution represents the longest implementation timeline, due to the complexity of designing and developing a core tax solution with modern and secure architecture, modern programming language and human-centric design and customer experience, similar to those of a large ERP solution • Due to the heavy reliance on professional services vendors to complete the work, this option significantly increases budget and schedule risks • Custom builds require a high degree of maturity on both development and support teams and are labor, cost and time intensive • Other than the core tax solution, the remaining observations would be similar to a Best-of-Breed solution	• A Single Vendor COTS solution will have a shorter implementation timeline relative to alternative approaches • Proper governance will be required to ensure that the capabilities of the existing system are adequately maintained or transformed	• For Best-of-Breed, the implementation timeline for all applications would still be similar to a Single Vendor COTS option • Proper governance will be required to ensure that the capabilities of the existing system are adequately maintained or transformed in a planned manner • Architectural complexity significantly increases budget and timeline risks, although this option allows Virginia Tax more flexibility to consider implementing solutions in phases

Figure 26. Change Management

Criteria Description		
The degree of change and complexity of transitioning from current state to target state		
Custom Solution	**Single COTS Solution**	**Best-of-Breed COTS Solution**
• The observations would be similar to a Best-of-Breed solution	• Although a single vendor COTS solution provides relatively lower architectural and vendor management complexity, implementing and transitioning from IRMS to this option will require significant change management and training due to change in user experience and business processes.	• The higher architectural and vendor management complexity of a Best-of-Breed solution will require users to adapt to multiple user experiences and process changes across systems, which will require significant change management, including training • Post-transition change management will be high with this solution, due to the multiple systems involved

4.1.3.5 Level-2 Evaluation – Cost Detail

Figure 27. Cost of Ownership (High Level 10-Year TCO)

Cost Categories		Cost of Ownership (High Level 10-Year TCO)								
		1. Custom Solution			2. Single COTS Solution			3. Best-of-Breed COTS Solution		
		Low	Med	High	Low	Med	High	Low	Med	High
		6-7 years	8 years	9-10 years	3-4 years	4 years	4-5 years	3-4 years	4 years	4-5 years
One-Time Costs Implementation	Configuration/Development Services	$ 92,494,000	$ 115,617,000	$ 138,741,000	$ 32,207,000	$ 40,259,000	$ 48,310,000	$ 46,196,000	$ 57,746,000	$ 69,295,000
	Data Conversion Services	$ 7,654,000	$ 9,567,000	$ 11,481,000	$ 3,711,000	$ 4,639,000	$ 5,566,000	$ 6,030,000	$ 7,538,000	$ 9,046,000
	OCM & Training Services	$ 8,904,000	$ 11,130,000	$ 13,356,000	$ 3,625,000	$ 4,531,000	$ 5,437,000	$ 6,757,000	$ 8,446,000	$ 10,135,000
	Testing Services	$ 16,132,000	$ 20,165,000	$ 24,198,000	$ 5,394,000	$ 6,743,000	$ 8,092,000	$ 7,946,000	$ 9,932,000	$ 11,919,000
	Independent Verification & Validation (IVV)	$ 5,990,400	$ 7,488,000	$ 8,985,600	$ 2,995,200	$ 3,744,000	$ 4,492,800	$ 4,792,000	$ 5,990,000	$ 7,188,000
	Virginia Tax Staff (IT & Business)	$ 4,480,000	$ 5,600,000	$ 6,720,000	$ 8,400,000	$ 10,500,000	$ 12,600,000	$ 10,720,000	$ 13,400,000	$ 16,080,000
	Sub Total	**$ 135,654,400**	**$ 169,567,000**	**$ 203,481,600**	**$ 56,332,200**	**$ 70,416,000**	**$ 84,497,600**	**$ 82,441,000**	**$ 103,052,000**	**$ 123,663,000**
Recurring Costs Licensing, Hosting & Support	COTS Tax Administration Solution	$ -	$ -	$ -	$ 36,630,000	$ 45,788,000	$ 54,945,000	$ -	$ -	$ -
	Core Tax Processing Solution	$ -	$ -	$ -	$ -	$ -	$ -	$ 21,978,000	$ 27,473,000	$ 32,967,000
	Tax Portal Solution	$ 2,280,000	$ 2,850,000	$ 3,420,000	$ -	$ -	$ -	$ 2,280,000	$ 2,850,000	$ 3,420,000
	CRM Solution	$ 2,880,000	$ 3,600,000	$ 4,320,000	$ -	$ -	$ -	$ 2,880,000	$ 3,600,000	$ 4,320,000
	Case Management Solution	$ 2,160,000	$ 2,700,000	$ 3,240,000	$ -	$ -	$ -	$ 2,160,000	$ 2,700,000	$ 3,240,000
	EiPaaS and Business Intelligence Solution	$ 8,000,000	$ 10,000,000	$ 12,000,000	$ -	$ -	$ -	$ 8,000,000	$ 10,000,000	$ 12,000,000
	Support (Med: 2 Yrs for Custom and 6 Yrs for COTS and Best of Breed)	$ 16,736,000	$ 20,920,000	$ 25,104,000	$ 16,320,000	$ 20,400,000	$ 24,480,000	$ 34,537,000	$ 43,171,000	$ 51,805,000
	Sub Total	**$ 32,056,000**	**$ 40,070,000**	**$ 48,084,000**	**$ 52,950,000**	**$ 66,188,000**	**$ 79,425,000**	**$ 71,835,000**	**$ 89,794,000**	**$ 107,752,000**
Cost of Ownership	**Totals**	**$ 167,710,400**	**$ 209,637,000**	**$ 251,565,600**	**$ 109,282,200**	**$ 136,604,000**	**$ 163,922,600**	**$ 154,276,000**	**$ 192,846,000**	**$ 231,415,000**
	Assessment Results									

Cost of Ownership – Key Assumptions

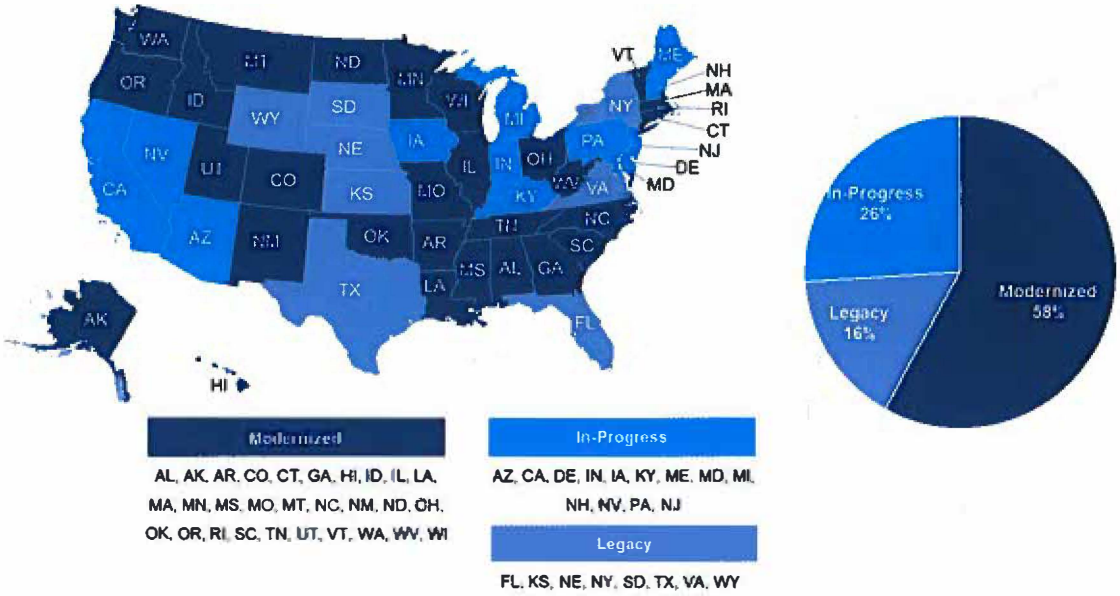
1. Estimates represent directional cost ranges and may differ from vendor proposals, which will be tailored to the more detailed requirements established at the time of a potential request for proposals (RFP); Low and High estimates represent 20%+/- variance for planning purposes.
2. Vendor approaches for bundling and pricing products have evolved over time and may differ at the time of proposal submission.
3. Ongoing software licensing and hosting estimates are based on the number of concurrent users, usage levels and/or market pricing derived from organizational information provided by Virginia Tax as part of this effort.
4. Estimated implementation costs include solution configuration, development, testing, data conversion, OCM/training and provisioning of three environments (development, test/train, production), for all tax programs administered by Virginia Tax and assumes reasonable levels of concurrency across implementation activities.
5. System Integrator, Data Conversion and OCM/Training resource needs and hourly rates assume staffing levels in line with those of prior engagements; COTS vendors do not price their fees by 'rate card' but leverage a combination of factors to determine overall cost
6. Virginia Tax Staff costs represent existing internal staff from IT and Business to support the implementation. (For the Custom Solution, the costs are for Business staff only, IT staff costs are included in the configuration/development services)
7. For Virginia Tax budget planning purposes, please note that this cost estimate does not include:
   - Vendor discounts
   - Decommissioning costs
   - Backfill costs for Virginia Tax FTEs dedicated to new solution implementation
   - Pre-award procurement support costs (RFP development, requirements definition, vendor proposal review, etc.)
   - Additional development, test, training or staging environments
   - Analytics product/tools that may be required to report on historical & operational data
   - Cost of premium product support and any additional post-go-live managed services
   - Hardware or software (including any licenses for virtual machines) related to network upgrades or other networking or hardware required to support the Custom Solution

4.2 Nationwide Tax & Revenue – Modernization Status

At the start of the new millennium, state revenue agencies began to shift away from legacy mainframe and transfer systems, instead undertaking modernization journeys that ushered in a new era of successful COTS implementations.

It is important to note that, of the 26% of states currently in-flight with modernization, approximately 31% of those are "re-modernizing," or updating, struggling initiatives. These are excellent case studies that underline the importance of establishing strong modernization strategies and plans to avoid or mitigate project challenges that could result in failure.

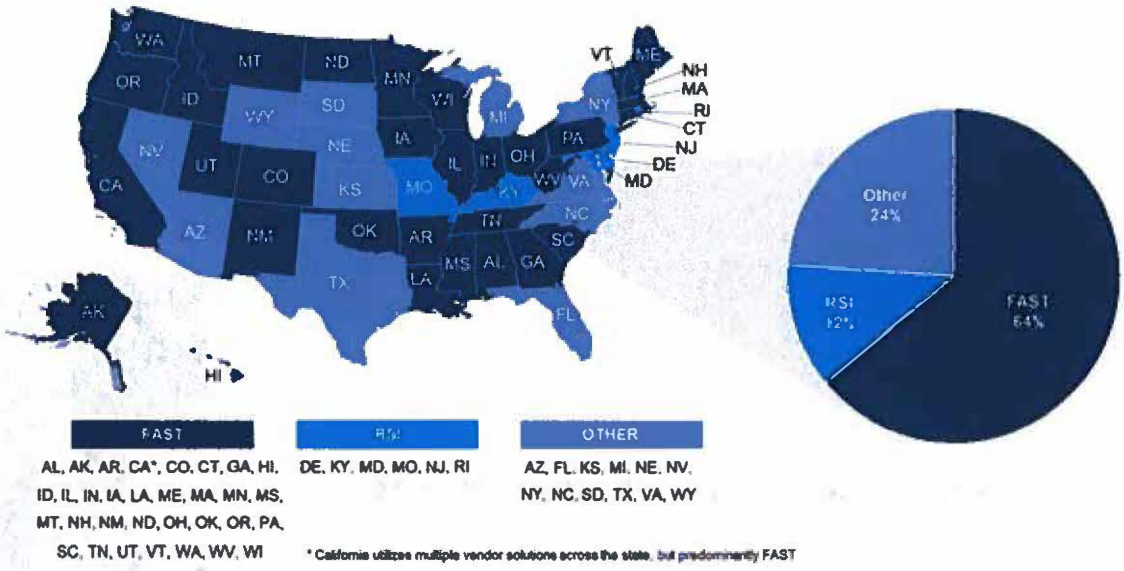
Figure 28. Nationwide Tax & Revenue – Modernization Status



4.3 Nationwide Tax & Revenue – Solution Landscape

In what is a compelling statistic reflecting the increased trend towards COTS and/or packaged integrated tax solutions over the past 20+ years, over 75% of state revenue agencies are planning to, are in the midst of, or have already modernized onto a COTS platform. Of the remaining state revenue agencies still operating on legacy technology platforms, two are currently in the process of procuring for a COTS solution (Arizona and Nevada), while three others could argue they are operating on what would be referred to as 1st Generation COTS (Michigan, North Carolina and Florida). Nationwide Tax & Revenue – Solution Landscape

Figure 29. Nationwide Tax & Revenue – Solution Landscape



Recommendation and Roadmap

Gartner.

5.0 Recommendation and Roadmap

5.1 Recommendation

Based on the Level-2 Evaluation of the three viable modernization options, **Gartner recommends pursuing a Single Vendor COTS Solution**. This option offers a number of advantages, including:

- Relatively shorter implementation timeframe results in rapid improvements across Virginia Tax's core tax management operations, earlier benefits realization and earlier mitigation of the loss of institutional knowledge/talent gap.
- Simplified architecture and minimal customization make the system more stable, easier to maintain and more agile, resulting in improved system reliability and faster time-to-production for legislative and other changes.
- Cloud based COTS solution (particularly in the form of SaaS) reduces the operational burden of running and maintaining hardware and software, which frees up IT staff to focus on more valuable innovation and growth initiatives.
- Most economically viable, with both the initial implementation and ongoing maintenance costing less than other options; and
- Single-vendor environment is simpler to manage from both contractual and system performance/service level agreement (SLA) perspective.

The transition from legacy technologies and processes to a modern solution involves a tremendous level of change, impacting most, if not all, internal and external stakeholders. Gartner's recommendation to deploy a COTS integrated tax solution is a prudent, incremental step to modernizing both technology and operations, while establishing a platform to further enhance Virginia Tax's capabilities into the future.

Once Virginia Tax has implemented and stabilized its COTS tax system, further adoption and expansion into more leading edge, innovative technologies should be considered if warranted by business needs and agency strategy. Examples of what could be considered post-stabilization include sophisticated predictive analytical tools, robotic process automation, and other capabilities considered as part of the **Best of Breed COTS Solution.**

5.1.1 Modernization Cost-Benefit Analysis

Gartner's Cost Benefit Analysis of Virginia Tax's IRMS Modernization initiative assumed a phased deployment of a COTS solution to onboard all tax programs over the 4-year implementation period. The analysis took into consideration the outcome of the "Strategic Alternatives and Impact Analysis," which determined the best fit for Virginia Tax would be a Commercial Off the Shelf (COTS), single vendor integrated tax solution. The scope of the analysis included Virginia Tax's current IT operating budgets for supporting all legacy technologies comprising IRMS, as well as all ongoing maintenance, support, licensing, and hosting costs. The full benefits and total cost of ownership (TCO) analysis span a 10-year timeline to ensure consideration of a sufficient period of stable maintenance and support operations.

Virginia Tax will achieve not only significant cost savings, but will realize substantial financial benefits across steady state operations from year 5 onwards, as depicted in the following figures:

Figure 30. Cost Benefit Analysis: Single Vendor COTS

Cost-Benefits Analysis Single Vendor COTS	Year-1 FY 2025	Year-2 FY 2026	Year-3 FY 2027	Year-4 FY 2028	Year-5 FY 2029	Year-6 FY 2030	Year-7 FY 2031	Year-8 FY 2032	Year-9 FY 2033	Year-10 FY 2034	Total
Total Cost of Ownership (Implementation, Maintenance & Support)	$22,182,500	$22,182,500	$22,182,500	$22,182,500	$7,979,000	$7,979,000	$7,979,000	$7,979,000	$7,979,000	$7,979,000	**$136,604,000**
Total Estimated Financial Benefits	$0	$7,575,601	$16,362,132	$26,965,057	$35,146,123	$40,905,330	$46,664,537	$46,664,537	$46,664,537	$46,664,537	**$313,612,393**
Annual Net Benefit	-$22,182,500	-$14,606,899	-$5,820,368	$4,782,557	$27,167,123	$32,926,330	$38,685,537	$38,685,537	$38,685,537	$38,685,537	**$177,008,393**
Cost to Benefit Ratio											**230%**

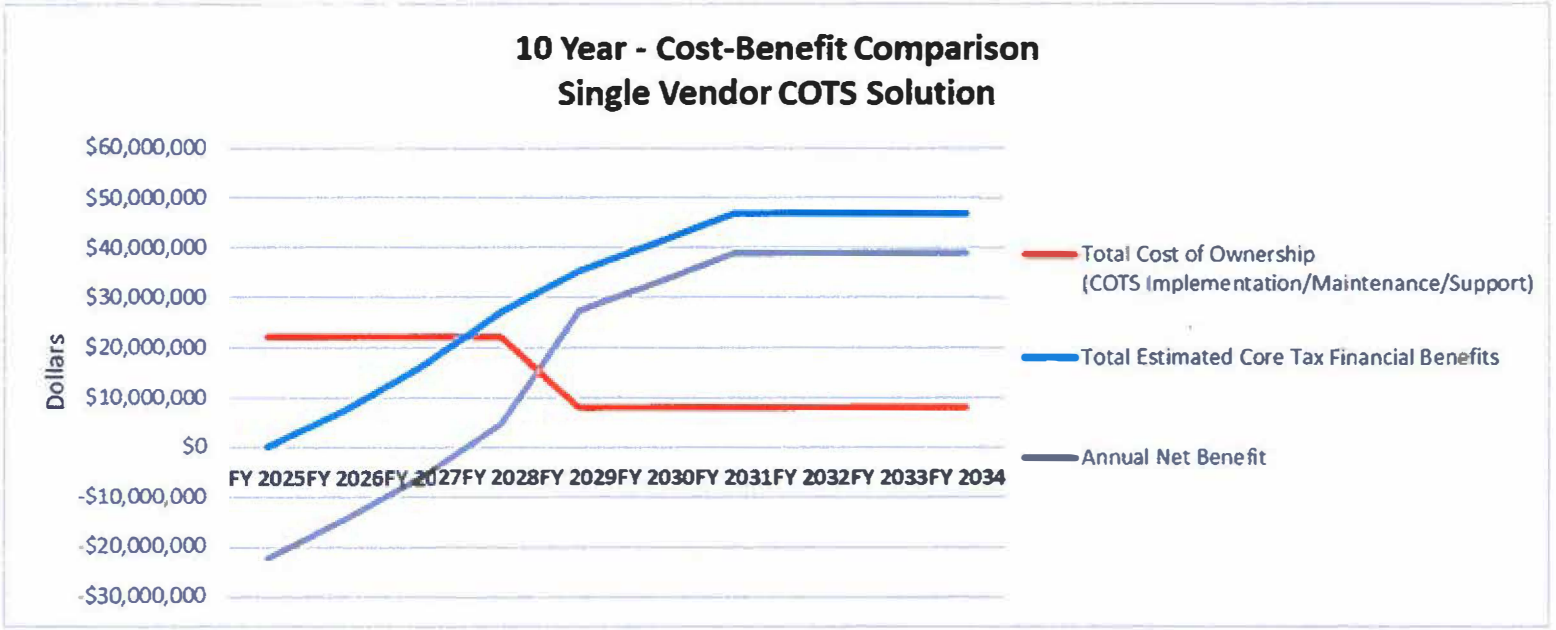


Figure 31. Cost Estimate Detail: Single Vendor COTS

Single Vendor COTS	Year-1 FY 2025	Year-2 FY 2026	Year-3 FY 2027	Year-4 FY 2028	Year-5 FY 2029	Year-6 FY 2030	Year-7 FY 2031	Year-8 FY 2032	Year-9 FY 2033	Year-10 FY 2034	Totals
Implementation	$22,182,500	$22,182,500	$22,182,500	$22,182,500							$88,730,000
Ongoing					$7,979,000	$7,979,000	$7,979,000	$7,979,000	$7,979,000	$7,979,000	$47,874,000
Totals	$22,182,500	$22,182,500	$22,182,500	$22,182,500	$7,979,000	$7,979,000	$7,979,000	$7,979,000	$7,979,000	$7,979,000	$136,604,000

Cost Category	Single Vendor COTS
System Integrator - Implementation Services	$ 56,071,000
Virginia Tax Staff - IT	$ 5,400,000
Virginia Tax Staff - Business	$ 2,800,000
Virginia Tax Staff - Training and Outreach	$ 2,400,000
Independent Verification and Validation (IV&V)	$ 3,744,000
Hosting	$ 7,150,000
Software Licensing	$ 11,165,000
Implementation Costs (4 Years)	**$ 88,730,000**

Cost Category	Single Vendor COTS
System Integrator - Ongoing Support	$ 2,200,000
Virginia Tax Staff - IT Ongoing Support	$ 600,000
Virginia Tax Staff - Business Ongoing Support	$ 400,000
Virginia Tax Staff - Testing Ongoing Support	$ 200,000
Hosting	$ 1,788,000
Software Licensing	$ 2,791,000
Subtotal Annual Ongoing Costs	**$ 7,979,000**
Ongoing Costs (6 Years)	**$ 47,874,000**

Cost-Benefit Analysis – Key Assumptions

Relevant assumptions were identified and documented appropriately and included such factors as average annual vendor costs, known licensing equivalents for similar implementations, service costs, etc. All inputs were compiled and utilized within our financial model to drive this comprehensive Cost Benefit Analysis, which shows Virginia Tax's expected overall cost of ownership, return on investment, and realized ongoing annual financial benefits.

In addition to the assumptions outlined in Section 4.1.3.5 Level-2 Evaluation – Cost Detail, the following assumptions were used for the cost benefits analysis:

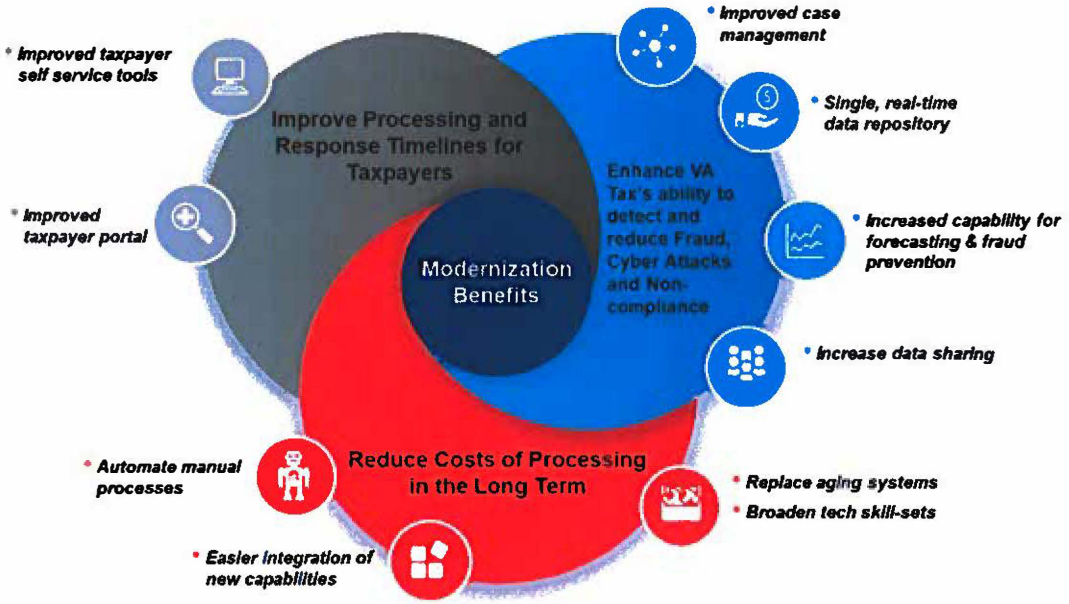
1. Increase in revenue collections of 10% per year based on total benefits based on FY2021 net revenue collections of $25,560,269,000; Increase in Revenue collections being driven by improved Collections and Audit efficiencies, improved case identification, centralized view of taxpayer liabilities across revenue programs, etc.
2. Cost avoidance driven by an estimated 65% reduction in current effort by Virginia Tax IT staff supporting legacy system fixes and legislative requests.
3. The solution will include four rollouts (deployments), with the first rollout in FY 2025; Initial benefits realization divided equally (25%) across the four rollouts.
4. Ongoing savings of approximately $12.4M annually by retiring legacy IRMS applications with the assumption of incremental decommissioning as follows: 15% after Rollout 1, 40% after Rollout 2; 80% after Rollout 3 and 100% after Rollout 4.
5. Operational improvements enabling increased audits or collections will generate additional revenue at a similar rate.
6. Current software maintenance and VITA hosting savings based on FY21 expenditures.
7. Virginia Tax will be able to secure funding, complete contracting, and other preparations for modernization by end of FY2024.

5.1.1.1 Summary Benefits of Modernization

Although Gartner demonstrates a material quantitative justification for investment in our Cost Benefit Analysis, there are also several qualitative justifications supporting modernization. The overarching benefits are: enhanced effectiveness of the system for ease of use and serving individual and business taxpayers and their agents, optimized productivity to streamline processing and collections, improved agility in response to legislative and other change requests and security and risk mitigation.

A representative sample of high-level qualitative benefits to be realized through Gartner's recommendation of a single vendor COTS tax solution are depicted in the following figure:

Figure 32. Overview of COTS Tax Solution Qualitative Benefits



5.2 Modernization Roadmap

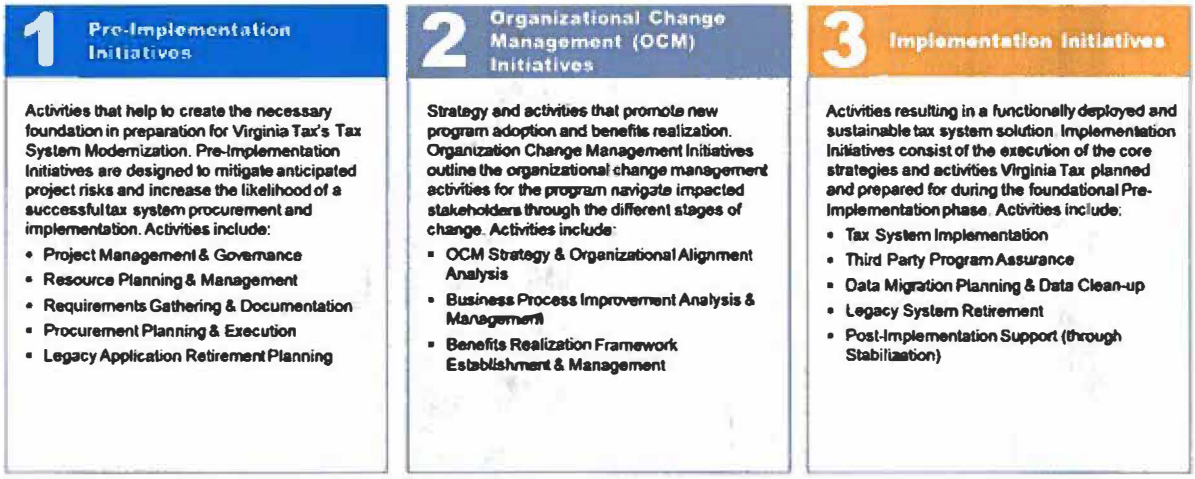
The Transformation Roadmap will guide future decision-making and the prioritization of Virginia Tax's Tax System Modernization initiatives by identifying the key objectives and activities necessary to achieve Virginia Tax's target state. Establishing a Strategy and Transformation Roadmap is intended to serve a number of purposes:

1. Define a feasible approach for the Virginia Tax's System Modernization program that is focused on the Commonwealth's strategic objectives
2. Maximize the chances of overall program success by outlining a logical sequence of activities and defining the appropriate planning approaches and timelines
3. Facilitate change management efforts by setting expectations on what will happen and when over the course of the modernization journey

5.2.1 Planning and Implementation Initiatives and Timeline

The Strategy and Transformation Roadmap is organized into three groups of initiatives that help logically segment the priority and sequence of activities to enable effective planning for the resources most relevant at each stage of the transformation:

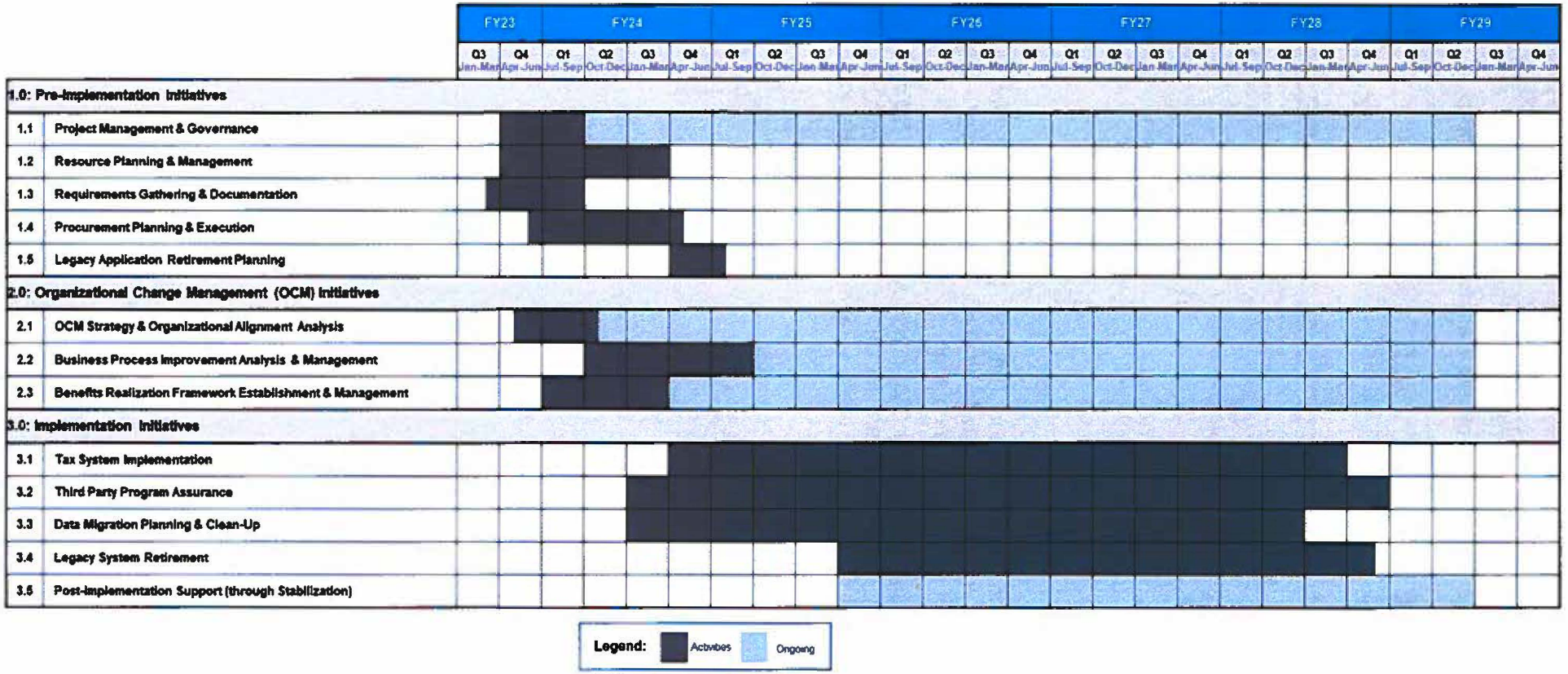
Figure 33. Three Groups of Initiatives for Strategy and Transformation Roadmap



As shown on the Planning and Implementation Timeline, the three initiatives are not purely sequential, there are a number activities that should be executed concurrently to best position the Commonwealth for a successful system implementation.

The timeline shows the expected duration for "Activities" and "Ongoing" tasks. The Activities component consists of the key tasks to prepare for and execute each initiative, whereas the Ongoing component includes the maintenance tasks performed once preparation and execution are complete.

Figure 34. Timeline for Activities and Ongoing Tasks



5.2.2 Transformation Roadmap Initiatives

5.2.2.1 Pre-Implementation Initiatives

The Pre-Implementation phase lays the foundation for a successful tax system implementation. It is comprised of five initiatives:

1. Project Management & Governance
2. Resource Planning & Management
3. Requirements Gathering & Documentation
4. Procurement Planning & Execution
5. Legacy Application Retirement Planning

The key activities, estimated timeframe, dependencies and constraints, success factors, risks and estimated level of effort for each initiative are outlined in following sections.

5.2.2.1.1 Pre-Implementation Initiative: Project Management & Governance

The goal of this first Pre-Implementation Initiative is to ensure that the project management staff, tools and framework are place to lead the tax system implementation from the procurement process through system implementation and into operational stabilization. This includes identifying the project manager and support staff, establishing a governance structure that includes executive sponsors and internal leadership stakeholders and performing the planning and preparation necessary to ready Virginia Tax for the system implementation phase.

The initial setup of the Project Management Office (PMO) and the establishment of the PM and governance plans, processes and tools are expected to last approximately six months, with project and governance management ongoing throughout all phases of the implementation. Key components of the Project Management & Governance Initiative are included in the figure below:

Figure 35. Project Management & Governance Key Components

Project Management & Governance

Duration

6 months; ongoing

Description

Create a framework built around the right decision-makers, capabilities and Department strategy to enforce provisions for making strategic decisions about project execution and aligning priorities. Establish new or enhance existing Project Management Office (PMO) to oversee the Modernization Project and balance operational and implementation priorities.

Key Activities

- Define overall project governance structures including Project Executive Sponsor, Steering Committee, Project Management and Business and Technical Owners. Identify key roles, responsibilities, communication flows and a decision-making model to prioritize key decisions
- Socialize the preliminary governance structure with key stakeholders
- Identify internal candidates or recruit external candidates to lead Virginia Tax's system modernization project (as Program Manager) and fill Project Management support roles (e.g., PM Analysts)
- Develop PM tools (Project Charter, Project Management Plan, Communications Plan, etc.)
- Establish Executive Steering Committee (ESC) to oversee the modernization project and make strategic project-related decisions; develop tentative schedule for ESC meetings
- Develop and finalize a Project Charter that clearly and formally documents the project structure, governance, vision, objectives, guiding principles, roles and responsibilities

Sequence and Duration

- **Start:** Begin governance planning immediately, 1 month
- **Establish PMO:** 3-5 months
- **Execute Project Governance:** Ongoing throughout implementation

Dependencies and Constraints

- Ability to centrally manage, review and authorize allocation and prioritization of resources
- Funding for Project Manager
- Project Management Office standup costs
- External Hiring – if required, may extend duration

Success Factors / Risks

- Benefits realization relies on commitment and use of new governance structures
- Governance and project management structures may shift internal power structures, resulting in organizational disruption

Estimated Level of Effort

- Establishment of project governance structures and PMO standup are resource intensive and will require a front loading of effort by project leadership. Once established, formal processes greatly reduce the effort required for strategic and prioritization decisions

5.2.2.1.2 Pre-Implementation Initiative: Resource Planning & Management

The goal of this second Pre-Implementation Initiative is to ensure that resource planning performed. This includes identifying and engaging the appropriate functional and technical staff, establishing the required dedication level for these resources across project phases, preparing for knowledge transfer and hiring and preparing backfill staff, as needed.

Key components of the Resource Planning & Management Initiative are included in the figure below:

Figure 36. Resource Planning & Management

Resource Planning & Management

Duration
12 months

Description

Assess resource requirements for implementation and on-going operational needs, to include existing skillsets and Subject Matter Expert (SME) capabilities, single- or dual-leveraged resources and vendor lift. Create a strategy to mitigate implementation resource needs and anticipated turnover, source expert and backfill staff and secure needed funding.

Key Activities

- Assess business and technical support needs for modernization planning, procurement and implementation phases
- Create resource strategy that supports concurrent system implementation and day-to-day Tax operations
- Coordinate with Human Resources and Procurement to identify and on-board staff/contractor resources
- Draft mapping of technical and business skills required to execute the modernization (e.g., project management, vendor management, DBA, interface development, IV&V etc.)
- Identify relevant vendor capabilities or activities for which a potential vendor may provide project support and necessary skills
- Identify SMEs and other Department staff who will be part of the implementation team and forecast resource requirements (e.g., 25%, 50%, 100% of available time)
- Forecast staffing plan for project/business needs and turnover (voluntary/retirement) to fill resource gaps, identify backfill requirements and project additional funding requirements
- Identify an operational process where institutional knowledge is retained by individuals / small teams; begin implementing policies to enforce creation of training and reference documents

Sequence and Duration

- **Start:** Begin developing Resource Plan immediately, 1-2 months
- **Implementation and Backfill Staffing:** 8-10 months

Dependencies and Constraints

- Determination of vendor vs. Department responsibilities and activities
- Accurate assessment of skillsets needed for implementation
- Securing funding for additional staff
- Funding available for staffing
- Availability and ability to attract qualified staff for operations and implementation

Success Factors / Risks

- Communication and project planning between operational and implementation leaders
- Pressure to source staff may result in suboptimal hiring decisions

Estimated Level of Effort

- This initiative will require a high level of effort from Management Analysts and hiring and recruiting staff throughout the entirety of execution. Resource requirements and capability mapping is complex and requires input from individuals across the organization

5.2.2.1.3 Pre-Implementation Initiative: Requirements Gathering & Documentation

The goal of this third Pre-Implementation Initiative is to gather and document the functional and technical system requirements that will form the basis of the tax system Request for Proposal (RFP). The requirements should address the needs of agency business and technical staff as well as external stakeholders, including business and individual taxpayers, tax preparers and taxpayer agents and the localities Virginia Tax shares data and transacts with. The requirements should be considered in the context of available market solutions and best practices for both tax processing and system implementation. During this phase, it will be critical to validate the documented requirements with the key internal and agency stakeholders to ensure the resultant system will best meet the breadth of identified needs.

Key components of the Requirements Gathering & Documentation Initiative are included in the figure below:

Figure 37. Resource Planning & Management

Requirements Gathering & Documentation

Duration
7 months

Description

Identify and clearly define the scope of the solution and implementation services for the future tax system, in line with agency strategic goals and business and technical needs.

Key Activities

- Assemble cross-functional working group of business users from appropriate divisions to support development of functional requirements for the future state solution
- Identify Office of Technology resources to support development of non-functional requirements (e.g., integration, security, etc.) for the future state solution
- Draft functional and non-functional requirements based on solution architecture, standards & best practices
- Perform a series of workshops to document, validate and finalize internal and external stakeholder functional and non-functional requirements
- Further refine Business Capability Model (BCM), per the established requirements
- Develop detailed scope of work (SOW) to include in a procurement package

Sequence and Duration

- **Start:** Begin gathering and defining requirements immediately, 6-7 months

Dependencies and Constraints

- Establishment of appropriate program governance to ensure appropriate resources are included in this initiative, and appropriate coverage is provided to make key functional and non-functional decisions with respect to requirements definition
- Development of initial procurement strategy, which will inform how the requirements are drafted and to what extent implementation services are defined and included

Success Factors / Risks

- Scope of the solution and implementation services not properly documented, resulting in scope creep and additional costs for implementing the solution in the future
- The vendor has a clear understanding of the future state requirements (functional and technical) for proposing appropriate costs, timing and project resourcing for the implementation

Estimated Level of Effort

- This initiative will require a high level of effort across program leadership, IT and all functional areas within the Department

5.2.2.1.4 Pre-Implementation Initiative: Procurement Planning & Execution

The goal of this fourth Pre-Implementation Initiative is to identify the scope of all project-related procurement needs and develop and execute a Procurement Plan that outlines the acquisition strategy and timeline for all contract activities. During this phase, the Procurement Office will work with the PMO to determine what, if any, services will be required in addition to the system implementation itself. Examples of additional services commonly utilized by tax agencies for similar efforts include requirements gathering, RFP preparation and proposal evaluation, organizational change management (OCM) support and independent verification and validation (IV&V). Once the scope of services is finalized, the Procurement Office will coordinate the execution of the Procurement Plan through the execution of all necessary contracting activities.

Key components of the Procurement Planning & Execution Initiative are included in the figure below:

Figure 38. Procurement Planning & Execution

Procurement Planning & Execution

Duration

11 months

Description

Determine the procurement approach for the tax system implementation and any supporting contract efforts throughout the pre-implementation, implementation and post-implementation phases. Develop a procurement package that enables vendors to appropriately bid for the software implementation and related services. Execute procurement activities through contract award.

Key Activities

- Identify contractor support needs, if any, for implementation-related activities (RFP development, organizational alignment assessment, OCM, IV&V, etc.)
- Develop the procurement approach and contract type(s) for the system implementation and any related supporting activities
- Develop and publish RFP(s), conduct procurement activities (evaluations, demonstrations, etc.) and award system implementation and related support contract(s), including post-implementation support, where applicable

Sequence and Duration

- **Start:** Develop strategy in parallel to the development of the RFP; 1 month
- **Develop and Issue RFP:** 6 months
- **Vendor Response Period:** 2 months
- **Evaluation of Vendor Responses and Vendor Selection:** 3 months

Dependencies and Constraints

- Evaluation criteria and selection process
- Contracting approach and timeline development
- Allocation of staff members to lead evaluation and vendor selection process
- Department and Commonwealth Policies and Practices
- Staff availability
- External factors (e.g., macroeconomic, remote delivery alignment, etc.)
- Funding support

Success Factors / Risks

- Staff limitations (e.g., time limitations, conflicting priorities) may result in delays
- Ensure alignment with Commonwealth policies and practices to address potential vendor protests
- Multiple qualified vendor responses may impact the timeline and the ability to objectively articulate and evaluate each response

Estimated Level of Effort

- Effort required will be cyclical (e.g. high effort during development and issuance of the RFP, moderate-to-low effort during vendor response period, and high effort during evaluation of vendor responses)

5.2.2.1.5 Pre-Implementation Initiative: Legacy Application Retirement Planning

The goal of this fifth Pre-Implementation Initiative is to identify the legacy applications to be retired following each of the phased rollouts of the new tax system implementation. For each retirement, Virginia Tax should define the Legacy Application Retirement Plan, to include the list of hardware and software to be decommissioned, data retention requirements, disposal approach and timing of the decommissioning in relation to the replacement system's go-live. Retirement planning should include identifying related contracts and peripheral services to be terminated, such as network, telecom and data center.

Key components of the Legacy Application Retirement Planning Initiative are included in the figure below:

Figure 39. Legacy Application Retirement Planning

Legacy Application Retirement Planning

Duration

4 months

Description

Develop anticipated legacy system decommissioning approaches as it should align with the deployment of a modern COTS integrated tax solution. Anticipated scope of a modern system would be required at this stage to inform which legacy systems/applications should eventually be "consumed" by a modern solution, and subsequently decommissioned, along with timing.

Key Activities

- Determine the approach and timeframe for decommissioning legacy applications, including wiping and disposing of hardware
- Establish data retention policy and approach
- Identify legacy contracts for components that will be retired and plan for their termination

Sequence and Duration

- **Start:** Develop strategy once scope of modernization is fully defined, and legacy applications that will be consumed by new solution have been clearly identified for decommissioning.

Dependencies and Constraints

- Project governance
- Funding requirements
- Procurement and external vendors
- Resource availability and knowledge of legacy systems/applications

Success Factors / Risks

- If the legacy infrastructure and hardware is not assessed prior to vendor implementation, Virginia Tax may run the risk of not being prepared for migration and ultimately decommissioning (i.e., unnecessary ongoing costs may be incurred due to legacy systems being maintained in-parallel with a modernized solution)

Estimated Level of Effort

- This effort requires a heavy lift from IT staff to conduct a full evaluation of infrastructure and hardware. However, evaluation and remediation are lengthy processes which do not need to be conducted immediately

5.2.2.2 Organizational Change Management (OCM) Initiatives

The Organizational Change Management phase positions the Commonwealth to maximize the benefits of the new system through process optimization, improved organizational alignment and stakeholder preparation. The OCM phase is comprised of three initiatives:

1. OCM Strategy & Organizational Alignment Analysis
2. Business Process Improvement Analysis & Management
3. Benefits Realization Framework Establishment & Management

The key activities, estimated timeframe, dependencies and constraints, success factors, risks and estimated level of effort for each initiative are outlined in following sections.

5.2.2.2.1 OCM Initiative: OCM Strategy & Organizational Alignment Analysis

One goal of this first OCM Initiative is to identify the OCM needs resulting from the tax system implementation and translating them into an OCM Strategy and Plan that addresses key activities such as communications, training and engagement. Another goal of this Initiative is to perform the high-level organizational alignment analysis and identify re-alignment opportunities that would position Virginia Tax to best capitalize on the new system's capabilities. An example would be to potentially shift some web portal management responsibilities to the Communications Team or shift the processing of some of the miscellaneous taxes to Returns Processing. This analysis would culminate in the production of an Organizational Alignment Plan.

The OCM and organizational analysis and subsequent production of the OCM Strategy and Plan and the Organizational Alignment Plan are expected be completed within approximately six months, with OCM execution and organizational alignment activities ongoing throughout all phases of the implementation. Key components of the OCM Strategy & Organizational Alignment Analysis Initiative are included in the figure below:

Figure 40. OCM Strategy & Organizational Alignment Analysis

OCM Strategy & Organizational Alignment Analysis

Duration

6 months; Ongoing

Description

Develop an Organizational Change Management (OCM) strategy to plan communicate and execute organizational change initiatives to ensure the Department workforce maintains focus and energy amid the disruption of implementation. Take actions to preventatively identify and diagnose operational and implementation conflicts or other factors negatively impacting organizational effectiveness.

Key Activities

- Establish the approach for OCM support during and after implementation (in-house, implementation vendor, 3rd party contractor, etc.)
- Develop the high-level organizational change management strategy to plan, communicate and execute organizational change initiatives
- Evaluate current organizational alignment and identify areas of potential re-alignment (resulting from standardization of return and payment processing, portal consolidation, compliance case management, etc.)
- Develop and finalize Organizational Alignment Plan
- Perform advance activities to ensure re-alignment is completed as planned, in line with the implementation timeline

Sequence and Duration

- **Start:** Immediately establish strategy, guidelines, and champions; 3 months

Dependencies and Constraints

- Steering Committee guidance
- Funding support (if vendor will perform this activity)

Success Factors / Risks

- Department has limited recent experience implementing enterprise-wide, large-scale systems
- Staff may become disillusioned by change efforts if the project overpromises

Estimated Level of Effort

- OCM Strategy and Execution requires regular effort by the Project Manager, Change Champions, and agency leadership to maintain OCM momentum; while not resource intensive, it requires frequent upkeep

5.2.2.2.2 OCM Initiative: Business Process Improvement Analysis & Management

The goal of this second OCM Initiative is to identify new and document known business process improvement needs in advance of the tax system implementation. While some process changes will be a direct result of implementation design phase decisions and system constraints, other desired process improvements have already been identified and requested in relation to IRMS. This Initiative should include reviewing existing process change requests and key tax end-to-end processes to identify opportunities to streamline and align with current best practices. It should also entail reviewing forms, documents, websites and other Virginia Tax content and revising to ensure that the language and calculations presented to taxpayers and their agents are clear, straightforward and easy to understand.

The analysis and recommendations development are expected be completed within approximately twelve months, with process improvement activities continuing throughout all phases of the implementation. Key components of the Business Process Improvement Analysis & Management Initiative are included in the figure below:

Figure 41. Business Process Improvement Analysis & Management

Business Process Improvement Analysis & Management

Duration

12 months; Ongoing

Description

Opportunity for Virginia Tax subject matter experts (SMEs) to analyze, assess and improve operational processes in anticipation of modernizing core system functions. Clarifying and/or enhancing current operational processes prior to a system implementor arriving will better prepare the Virginia Tax teams when engaging with the system implementer (SI) during the design phase.

Key Activities

- Evaluate business processes for each BCM Level 1 area to identify desired areas of improvement prior to vendor design and implementation
- Review existing forms and documents and revise (mockup) for plain language, clarity and consistency, to form the basis of templates in the new system
- Review open BSRs and other IRMS system change requests and identify enhancements to incorporate into system replacement requirements
- Identify desired legislative changes that would complement system implementation
- Create an inventory of target state process and artifact changes (forms, reports and correspondence)

Sequence and Duration

- **Start:** Approximately 6 months in advance of implementation start, with an expectation of this initiative carrying-on during the initial stages of modernization, and managed ongoing throughout modernization.

Dependencies and Constraints

- OCM strategy and Organizational Alignment
- Vendor Partner / SI Implementation Methodology and system processes

Success Factors / Risks

- Evaluating antiquated operational processes that may have evolved based on a number of constraints (e.g., system, technology, capability, etc.) and improving those processes will enhance the design process with the vendor partner
- Not taking an opportunity to analyze and improve operational processes could lead to re-creating existing problems and issues on modern technology; this could also force Virginia Tax to adopt a vendor's approach without adequately understanding why that would be a satisfactory option or not

Estimated Level of Effort

- This will require a high level of sustained effort from functional area subject matter experts and will necessitate close coordination with vendor and Virginia Tax project team members

5.2.2.2.3 OCM Initiative: Benefits Realization Framework Establishment & Management

The goal of this third OCM Initiative is to define the anticipated benefits of the tax system modernization, assign the related key performance indicators (KPIs) and performance targets and establish a measurement framework that outlines the approach and cadence for measuring progress against the targets.

The Benefits Realization Framework Establishment will be completed within approximately nine months, with measurement tracking continuing into the Post-Implementation phase. Key components of the Benefits Realization Framework Establishment & Management Initiative are included in the figure below:

Figure 42. Business Realization Framework Establishment & Management

Benefits Realization Framework Establishment & Management

Duration

9 months; Ongoing

Description

Define a framework for Key Metrics and Key Performance Indicator (KPI) measurements to track ongoing improvement processes throughout the implementation project. The agency and its constituent divisions should establish a current baseline for these metrics in order to measure the impact of future improvements.

Key Activities

- Review relevant Commonwealth and agency strategic plans to identify key performance targets the tax system implementation can support the achievement of
- Establish key performance measures and target baselines
- Define the framework for ongoing key performance indicator measurement and reporting
- Identify and formalize specific goals based on benefits identified by Gartner and the developing Business Case – develop goals concurrent with the Project Charter creation
- Identify specific individuals responsible for driving improvement, measuring progress and reporting to the Steering Committee

Sequence and Duration

- **Start:** Begin to identify goals concurrent with the Project Charter creation; 1 month
- **Define Tracking Methodology:** 1 month
- **Establish Baseline:** 1 month
- **Track Ongoing Improvement Process:** Ongoing with execution of project

Dependencies and Constraints

- Benefits must be identified that are achievable
- Resource availability and prioritization for execution of methodology

Success Factors / Risks

- KPI tracking inherently focuses effort on the indicator rather than the targeted benefit
- Benefits and KPIs must be SMART (specific, measurable, actionable, relevant and timebound), or they may result in inflated expectations of the internal/external stakeholders

Estimated Level of Effort

- This initiative requires a higher level of effort from staff and approval by Department leads at the start of the initiative, and requires a low-level on-going effort throughout the project for tracking purposes

5.2.2.3 Implementation Initiatives

The Implementation phase consists of all activities required to configure the tax system per Virginia Tax's requirements, ultimately culminating in the tax system's migration into Production and the decommissioning of the legacy system, IRMS. It is comprised of five initiatives:

1. Tax System Implementation
2. Third Party Program Assurance
3. Data Migration Planning & Clean-up
4. Legacy System Retirement
5. Post-Implementation Support (through Stabilization)

The key activities, estimated timeframe, dependencies and constraints, success factors, risks and estimated level of effort for each initiative are outlined in following sections.

5.2.2.3.1 Implementation Initiative: Tax System Implementation

The goal of this first Implementation Initiative is to successfully progress through the implementation lifecycle, including design, configuration, testing, training and deployment of the COTS integrated tax system. The implementation methodology used will likely be Agile, with iterative configuration and concurrent, rather than sequential, lifecycle phases.

The implementation is expected to be divided into phased rollouts of functionality packages over four years. Phase deployment is the typical implementation approach for integrated tax systems, and the sequencing would be determined based on Virginia Tax's priorities, with input and recommendations from the implementation contractor. For instance, Virginia Tax may choose to go live with miscellaneous taxes for rollout one, individual and corporate taxes for phase two and so on. Key components of the Tax System Implementation Initiative are included in the figure below:

Figure 43. Tax System Implementation

Tax System Implementation

Duration
48 months

Description

Following the successful evaluation, selection and award to Virginia Tax's vendor partner, activities aligned to the vendor's implementation methodology will commence. The design, configuration, testing, training and deployment of a modern COTS integrated tax solution will likely be "phased" across several roll-outs, encompassing logically grouped tax programs for each.

Key Activities

- Virginia Tax resources from all key agency functional areas to partner with vendor implementation team, including business and technical subject matter experts (SMEs); under the leadership of the project PM
- Virginia Tax leads for major implementation components to serve as agency vendor counterparts (Training Lead, Data Conversion Lead, Testing Lead, etc.)
- Implement the plan for backfilling SME roles, as needed
- Performing agency activities throughout the implementation lifecycle (design, test, etc.)

Sequence and Duration

- **Start:** Estimated commence date Q2 2024. Anticipated duration of 48 months for the implementation, with additional time expected for ongoing maintenance and support.

Dependencies and Constraints

- Successful procurement selection and award
- Completion and execution of Department's resource strategy to support modernization project as well as ongoing operations
- Modernization program funding
- Resource capabilities and availability

Success Factors / Risks

- Select a vendor partner with a proven track record of successful implementations
- Imperative to come to an amicable contractual agreement with the chosen vendor, so as to equitably protect the interests of both parties
- Inadequate procurement strategy and approach, along with lack of preparedness, may lead to challenges throughout the implementation, potentially resulting in time and cost overruns

Estimated Level of Effort

- Very high level of sustained effort is required by all of Virginia Tax's divisions, both functional and technical; effort required will peak depending on the phase of the implementation and the required involvement by specific groups (e.g., design phase will see an increase in time required by SME's)

5.2.2.3.2 Implementation Initiative: Third Party Program Assurance

The goal of this second Implementation Initiative is to increase the likelihood of successful project and OCM efforts by engaging objective third party experts to perform Independent Verification & Validation (IV&V) throughout project phases. The IV&V vendor will monitor project activities to ensure that vendors (Implementation, OCM, etc.) meet their contractual requirements. IV&V will typically provide monthly reporting, including risk assessments, to provide early warning of project concerns that could impact project cost, scope, schedule and/or quality.

IV&V typically begins before the Implementation contract award, progresses through the final phased rollout and continues briefly into the Post-Implementation stabilization period. Key components of the Third Party Program Assurance Initiative are included in the figure below:

Figure 44. Third Party Program Assurance

Third Party Program Assurance

Duration
54 months

Description

Engage independent third-party vendor to support Virginia Tax's modernization program assurance by providing Independent Verification and Validation (IV&V) services; IV&V partner will conduct regular, ongoing assessment of solution implementation activities to help ensure that services and functionality delivered by selected System Integrator(s) aligns with program objectives, scope, timeline and budget.

Key Activities

- Review vendor contracts, plans, policies and procedures to ensure consistency and mutual understanding between the agency and implementation and support vendors
- Design, develop and execute the monitoring approach for ensuring implementation compliance with contract and other mandates (e.g., performing deliverable reviews, progress assessments, etc.)
- Prepare baseline Risk and Issue Assessment against pre-defined assessment categories (e.g., Schedule, Scope, Quality and Budget)
- Monitor project activities and artifacts and communicate findings to project and agency leadership
- Deliver monthly Project Risk and Issue Assessments; monthly assessments will provide ongoing evaluation of project risks and issues across the pre-defined criteria above that may impact project success and will outline comprehensive and practical steps for risk/issue mitigation.
- Facilitate regular reviews executive project leadership to review project risks/issues, steps for mitigation to ensure solution alignment with strategic objectives during implementation

Sequence and Duration

- **Start:** Engage third party vendor approximately 3 months prior to start date for solution implementation
- **Provide Ongoing Assessment of Solution Implementation:** Continue throughout duration of solution implementation and early stabilization (expected to be approximately 54 months)

Dependencies and Constraints

- Successful procurement selection and award for tax solution(s) and implementation services
- Funding support

Success Factors / Risks

- Initiate procurement of IV&V services with sufficient time to align with anticipated implementation start date
- Ensure that Virginia Tax's PMO is structured to collaborate effectively with an IV&V partner
- Select IV&V partner with a proven track record of successful implementations

Estimated Level of Effort

- Moderate level of effort is required to plan and execute procurement of IV&V services in support of program assurance

5.2.2.3.3 Implementation Initiative: Data Migration Planning & Clean-up

The goal of this third Implementation Initiative is to establish a data governance body, identify all data sources for the data that will be migrated into the new system, determine the migration and retention/archiving approach, engage and train staff who will be involved in data clean-up and perform the cleansing activities.

Data Migration Planning typically takes approximately three months and begins prior to the Implementation contract award. Data Clean-up begins upon planning completion and progresses through a bulk of the final Implementation rollout. Key components of the Data Migration Planning & Clean-up Initiative are included in the figure below:

Figure 45. Data Migration Planning & Clean-up

Data Migration Planning & Clean-up

Duration
48 months

Description

Establish a Data Governance Body to guide governance practices, polices, and procedures and assign data managers responsible for data migration. Identify, assess and analyze the databases, datasets and data attributes required from each data source system (inclusive of all extant Access and Excel sources) that would be of value for data migration for the Tax Modernization Project.

Key Activities

- Establish a data governance body to guide data governance policies and procedures
- Analyze IRMS data universe and identify data to be migrated to the new solution
- Determine the data cleansing approach for areas in which there are known data inaccuracies and/or areas where there is duplicate and conflicting data
- Establish the plan for data clean-up, including identifying the staff to be dedicated to the clean-up and the process for ensuring data integrity and accuracy
- Manage data clean-up, including tracking and reporting on progress
- Establish policies and procedures for data ownership, access and control
- Develop a data retention policy for future data stored within the new system and ensure compliance with all Commonwealth and Federal regulations and policies
- Conduct workshops identifying current data quality issues and methods for quantifying and tracking each issues impact. For each issue identified, conduct a root cause analysis to determine appropriate future processes and ensure future data quality
- Create a migration plan for project implementation with assigned data stewards who own the responsibility for specific data set migration and verification

Sequence and Duration

- **Start:** Immediately - once business/data SMEs across departments are identified, 1-2 months
- **Establish Data Governance Body and Policies:** 1-2 months
- **Identify Data Attributes Across Data Sources:** 2-3 months
- **Classify and Unify Data Attributes:** 2-3 months

Dependencies and Constraints

- Stand-up of Project Governance, to coordinate with Data Governance development
- Identification of all data sources
- Data SMEs/DBAs/ISO availability
- Resource limitations
- Identification of all data sources from division representatives

Success Factors / Risks

- Lack of stakeholder urgency to resolve data issues and identify data sources; resource constraints
- Divisions are unable to work collaboratively to assess data issues and determine management

Estimated Level of Effort

- Effort required for root cause analysis is high, as it requires technical and business alignment across multiple divisions
- Updated data procedures and ownership require additional change management efforts and protocol enforcement

5.2.2.3.1 Implementation Initiative: Legacy System Retirement

The goal of this fourth Implementation Initiative is to retire legacy system components, per the Legacy Application Retirement Plan, following each of the phased system rollouts. Includes disposing of hardware and terminating hardware, software and peripheral service contracts, such as network, telecom and data center.

Partial legacy system retirement would begin after the first rollout, once the new system is operational and the Data Governance Board and executives are confident that there will be no need to fall back to the legacy system for Rollout One functionality. There will be subsequent partial retirements upon the completion of each rollout through full integrated tax system implementation.

Key components of the Legacy System Retirement Initiative are included in the figure below:

Figure 46. Legacy System Retirement

Legacy System Retirement

Duration
38 months

Description
Execution of Virginia Tax's established Legacy Application Retirement plan. Following the initial roll-out of the modern COTS integrated tax solution, Virginia Tax will have a clear view of the tax program(s) being supported by the new system, which will allow for the decommissioning of legacy applications/systems that had been supporting those programs.

Key Activities
- Execute planned data retention and disposal activities
- Terminate legacy contracts for components being retired
- Decommission legacy application components, including wiping and disposing of hardware

Sequence and Duration
- **Start:** Upon 1st go-live, approximately 12 months into implementation, with decommissioning activity following each of the phased rollouts.

Dependencies and Constraints
- Legacy Application Retirement plan
- Successful go-live for modern COTS integrated tax solution

Success Factors / Risks
- Successful go-live will be required, and a sufficient level of confidence from Virginia Tax leadership in the new system to support operations of tax programs moving forward
- Parallel operation of legacy and modern system(s) would result in delayed cost savings and has the potential to introduce data issues if strict data management and governance principles are not enforced

Estimated Level of Effort
- High level of coordinated effort across Virginia Tax IT team, functional SME's and possibly VITA, depending on the tax program(s) and supporting systems being decommissioned

5.2.2.3.2 Implementation Initiative: Post-Implementation Support (through Stabilization)

The goal of this fifth Implementation Initiative is to stabilize the system via intensive post-rollout support in preparation for standard operations and maintenance (O&M). During this intensive stabilization period, it is expected that security role and critical system issues will be identified upon initial processing and the implementation of fixes would be streamlined using an emergency change process. More comprehensive stabilization is expected to take 1-2 years and would occur primarily using the standard O&M processes.

Post-Implementation support would begin after the first rollout and would recur upon the completion of each rollout through full integrated tax system implementation.

Key components of the Post-Implementation Support Initiative are included in the figure below:

Figure 47. Post-Implementation Support (through Stabilization

Post-Implementation Support (through Stabilization)

Duration
45 months

Description

Performing Virginia Tax operations and maintenance counterpart activities for functions in Production starting with Phase 1 of the system rollout, continuing through each subsequent rollout and ending with full-system stabilization.

Key Activities

- Perform necessary SME tasks in support of the operations and maintenance team for functions in Production (prioritizing activities and change requests, testing changes, etc.), from through the established stabilization period, once all system functions are in Production

Sequence and Duration

- **Start:** Upon 1st go-live, approximately 12 months into implementation
- **System Stabilization:** Approximately 9 months after the final implementation; to be followed by standard operations and maintenance

Dependencies and Constraints

- Successful execution of organizational alignment
- Resource availability

Success Factors / Risks

- System support operations will be more successful if guided/complemented by Virginia Tax SMEs with knowledge of the system capabilities and configuration

Estimated Level of Effort

- High level of sustained effort is required by Virginia Tax's SMEs, both functional and technical; will require dual focus on implementation and Production support once the first phase of the system is live

Appendices

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6.0 Appendices

6.1 Legislative Budget Language

Figure 48. Legislative Budget Language

2022 Session

Budget Amendments - HB30 (Committee Approved)

Bill Order » Item 273 #1h

Authorize Study for New Tax Operating System (language only)

Item 273 #1h

Finance

Department of Taxation

Language

Page 272, after line 41, insert:

"D.1. The Department of Taxation shall conduct an assessment of the agency's Integrated Revenue Management System (IRMS). Specifically, the assessment shall include: an overview of IRMS and the role of each system and application; functionality requested by internal and external stakeholders, a blueprint of current functionality and gap analysis for each functional area; impact of any gaps or limitations on the agency's internal and external stakeholders; current system architecture and platform challenges and impact with the current technology state; impact of security limitations and risks; issues supporting the infrastructure including staff support; and a catalog of existing and future maintenance requirements.

2. Based on the findings from this assessment, the department shall develop guiding principles and potential options for addressing any identified shortcomings in IRMS including but not limited to refactoring and replacement. This portion of the assessment will address the department's goals and objectives for going forward with a potential modernization methodology and approach; benefits of modernization to the agency and stakeholders; a roadmap, and the project management and governance required to support any modernization effort.

3. The assessment shall include a cost and benefit analysis between the current and potential future state as well as the status of integrated tax solutions in other states. The department shall report its findings to the Chairs of the House Appropriations Committee and the Senate Finance and Appropriations Committee no later than December 16, 2022."

Explanation

(This amendment provides language directing the Department of Taxation to conduct an assessment of its existing operating system, the Integrated Revenue Management System (IRMS) and to report its findings by December 16, 2022.)

6.2 Gartner Corporate Profile, Independence and Objectivity

Gartner, Inc. (NYSE: IT) delivers actionable, objective insight to executives and their teams. Our expert guidance and tools enable faster, smarter decisions and stronger performance on an organization's most critical priorities. We are a trusted advisor and an objective resource for more than 14,000 enterprises in more than 100 countries — across all major functions, in every industry and enterprise size

Gartner joined the S&P 500 in April 2017. Founded in 1979 and headquartered in Stamford, Connecticut, USA, Gartner has over 16,000 associates in 90+ offices, including 2,150+ experts and 750 consultants who are committed to delivering forward-thinking expert insights, verified practitioner research and robust data analytics. We equip leaders with the right tools — tools that turn strategy into execution and drive real, measurable business results in every major business function in the enterprise including:

76% of the Global 500 support their key technology decisions with Gartner advice.

Gartner Consulting serves senior executives leading technology-driven strategic initiatives — **leveraging the power of Gartner's actionable, objective insight**. Through **custom analysis** and **on-the-ground support** we enable optimized technology investments and stronger performance on our clients' most critical priorities. We bring together research insight, benchmark data, problem-solving methodologies and hands-on experience to improve our clients' return on their IT investments.

Gartner's Unrivaled Independence and Objectivity

Virginia Tax maintains a diverse and ever-growing vendor ecosystem and therefore needs a partner that is vendor-neutral, with no incentive to make specific technology recommendations that might provide an opportunity for future work. As a hallmark of our business, we do not sell hardware or software and we do not partner with system integrators or vendors. This provides us with the unique ability to advise the Virginia Tax independently, objectively, without bias and without fear. Our sole focus is the success of the project.

Gartner's independence, objectivity and firsthand experience with managing mission-critical projects is unparalleled. Many consultancies claim to be unbiased, but Gartner has its objectivity and independence validated in the marketplace every day. This allows us to have an unwavering focus on business outcomes.

Figure 49. Gartner's Independence and Objectivity

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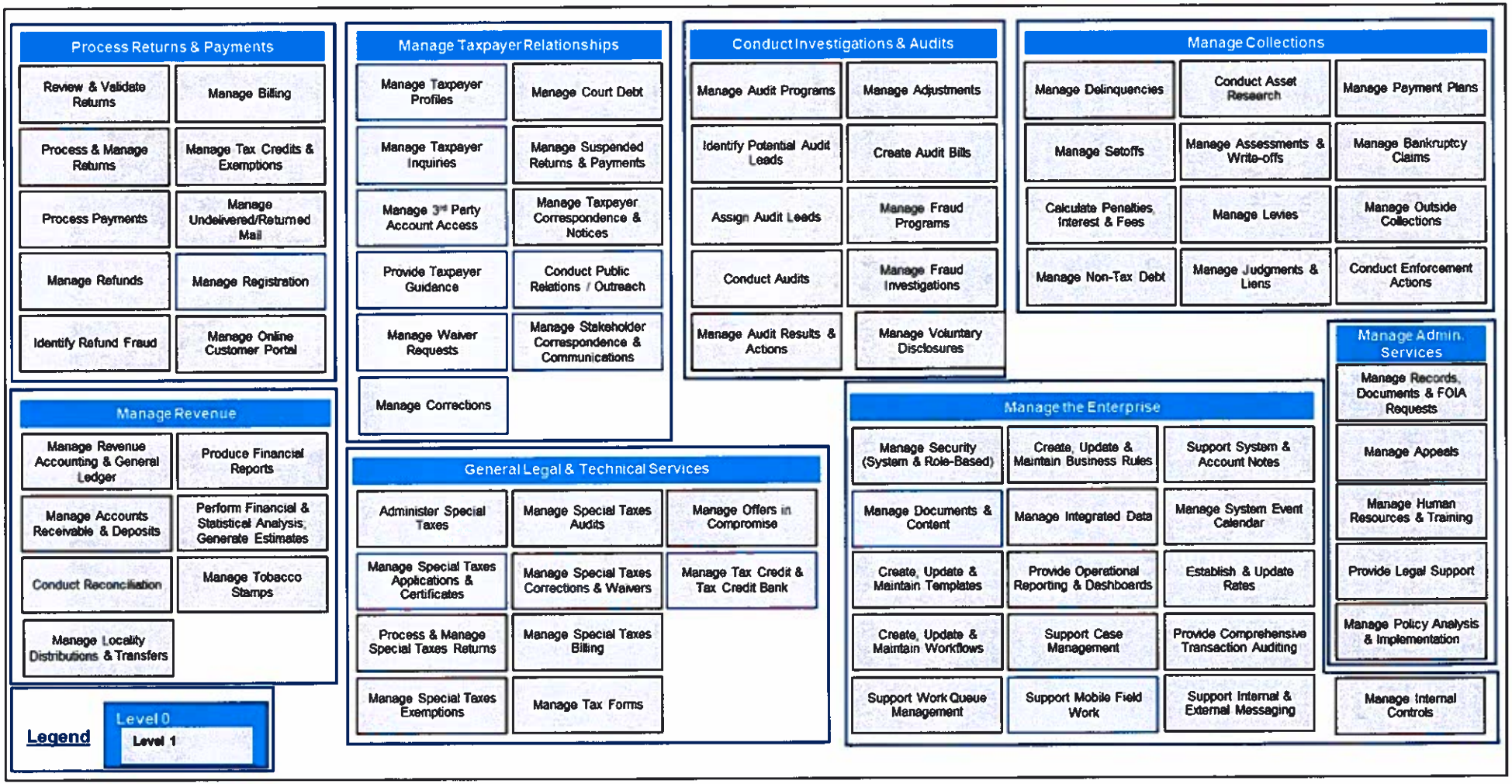
6.3 Virginia Tax Business Capability Model (BCM)

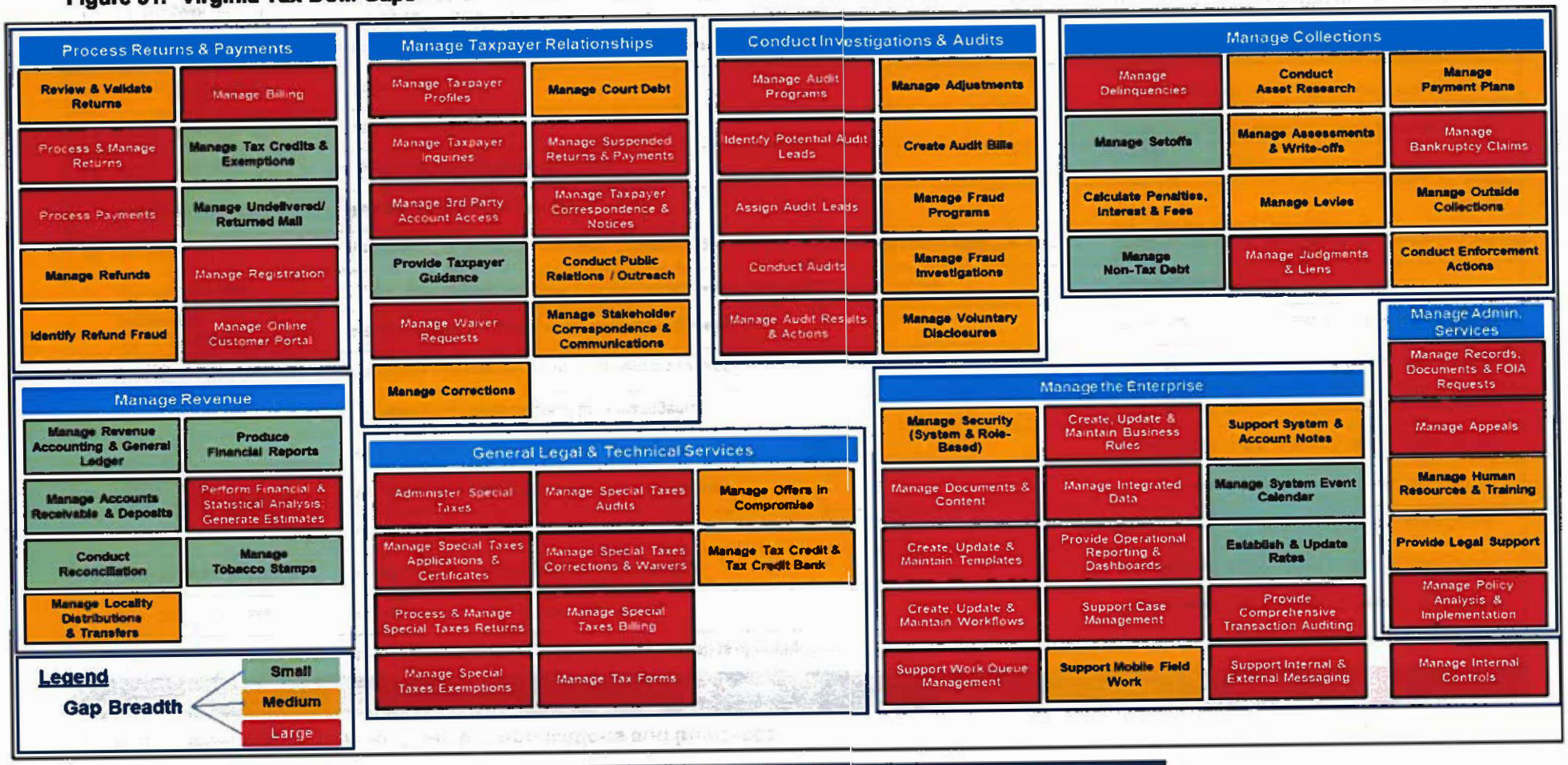
6.3.1 Virginia Tax Business Capability Model (BCM)

Figure 50. Virginia Tax BCM



6.3.2 Virginia Tax BCM Gaps

Figure 51. Virginia Tax BCM Gaps



6.4 Inventory of Core and Related Applications and Interfaces

The following table(s) summarize the role of each system and application within IRMS along with their enabling technologies and architecture diagram

Table 1. Inventory of Core and Related Applications and Interfaces

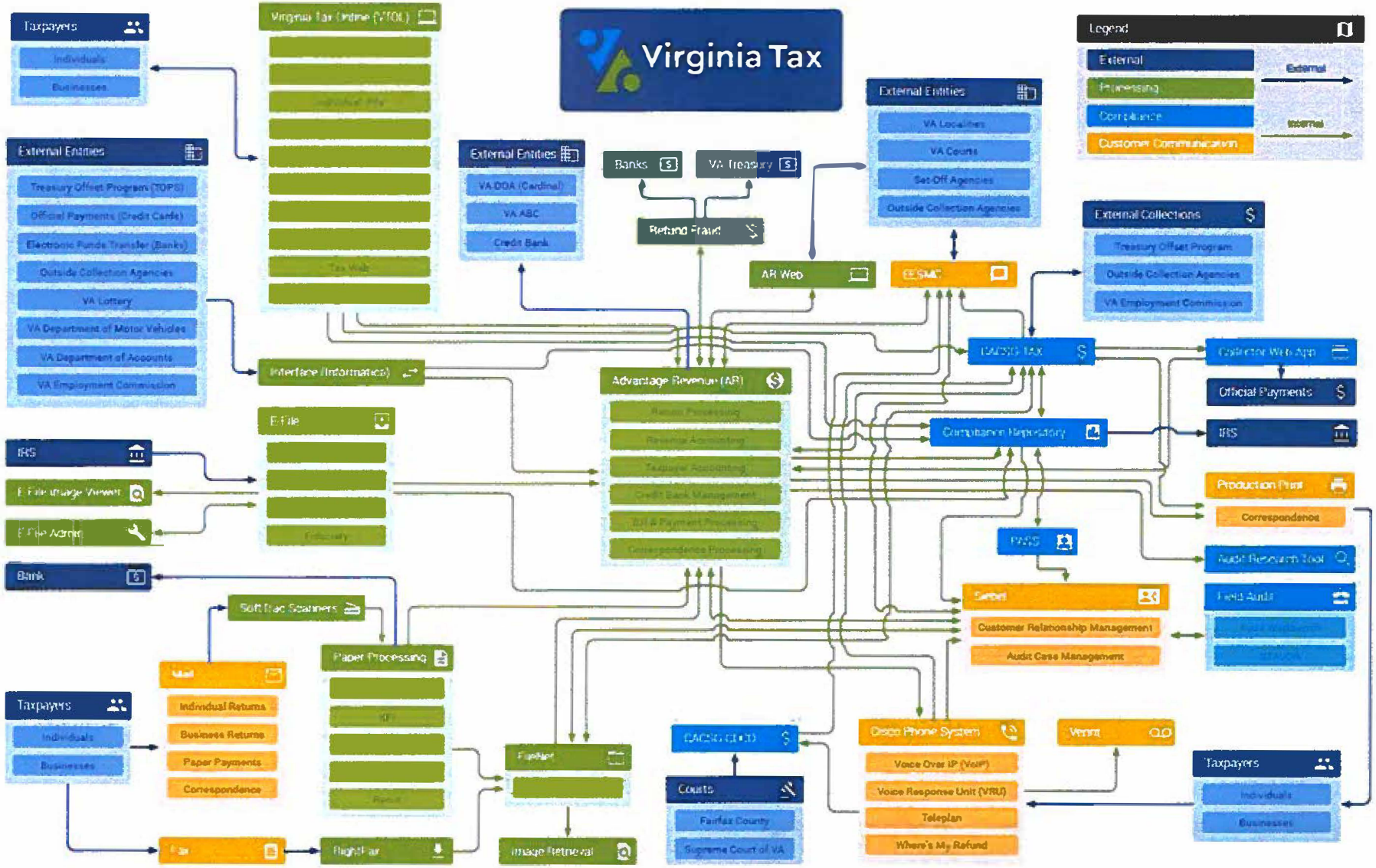
	Application	Description	Enabling Technologies
	AR (Advantage Revenue)	**Main Tax and Revenue system from that consists of multiple modules.**	
1	*AR - Return Processing*	AR module that supports return processing	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
2	*AR - Revenue Accounting*	AR module that supports revenue accounting	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
3	*AR - Taxpayer Accounting*	AR module that supports taxpayer accounting	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
4	*AR – Returns & External Offsets (REO)*	AR module that supports returns and external offsets	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
5	*AR – Tax Payor Information (PI)*	AR module that supports tax payor information	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
6	*AR - Credit Bank Management*	AR module that supports credit bank management	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
7	*AR - Bill & Payment Processing*	AR module the supports bill and payment processing	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
8	*AR - Correspondence Processing*	AR module that supports correspondence processing	PowerBuilder, Cobol, Visual C, Oracle, Linux Server
9	*AR - Return Fraud*	Used to track reports of identity theft from taxpayers to issue a PIN or other actions	PowerBuilder, PL/SQL
10	*AR Web*	Web based Tax system for localities, Collection Agencies and Setoff Agencies other state Agencies	Jboss Struts, Java, JSF, Oracle, Windows/Linus Server
	VTOL (Virginia Tax Online)	**Main group of systems for online access**	
11	*VTOL – Business iReg*	Register businesses for tax accounts	Jboss Springboot, Java, JSF, Oracle Database, Linux Server
12	*VTOL – Business iFile*	File business taxes	Jboss Springboot, Java, JSF, Oracle Database, Linux Server
13	*VTOL – Individual iFile*	File individual taxes	Jboss Springboot, Java, JSF, Oracle Database, Linux Server
14	*VTOL - eForms*	eForms are a fast and free way to file and pay state taxes online for individuals and businesses	Flash, HTML5, Oracle Database, Linux Server
15	*VTOL - Web Upload*	Web Upload is a quick and easy way to file and pay employer withholding, income tax statements (W-2/1099s), sales tax, and partnership VK-1 schedules. Provides bulk upload capability for tax preparers	Ruby on Rails, Oracle Database, Linux Server
16	*VTOL - Quick Pay*	Payment application for businesses and individuals include scheduling, history and outstanding tax bills	Java, Jboss Springboot, Oracle Database

	Application	Description	Enabling Technologies
17	*VTOL - Non-Profit Online*	Online application for non-profits to submit sales and use tax exemptions	Java, Jboss Springboot, Oracle Database
18	*VTOL - Where's My Refund*	Online application to check the status of expected refund amount	Java, Jboss Springboot, Oracle Database
19	*VTOL - Tax Web*	Replica of AR for localities	Java, Jboss Springboot, Oracle Database
20	*VTOL – TaxInk*	Application content labels and announcements management tool for IOP and iFile. Also used for user maintenance for iFile, IOP and RAP.	Java, Jboss Springboot, Oracle Database
21	*VTOL - Individual Online Portal (IOP)*	Individual Taxpayer protal for payments and lookups (cannot file)	
22	*VTOL - Web PPA*	Web Partial Payment agreement inside iFile and IOP	
23	*VTOL - RAP*	Fraud verification process for individual income tax	
24	*VTOL - Locality Code Lookup*	Locality fips code lookup	
25	*VTOL - Secure Messaging*	A channel for secure messages between taxpayers and TAX ; Taxpayers login using VTOL and send message to Siebel	
	eFile and Paper Processing	**Main group of applications for eFile and paper-based returns processing**	
26	*eFile*	eFile for Individual, Corporate, Pass-Thru Entities (PTE) and Fiduciary to download from IRS	C#, Oracle Database, Windows Server
27	*eFile Image Viewer*	Application to view return images, documents etc.	C#, Oracle Database, Windows Server
28	*SoftTrac Scanners*	Centralizes the setup of document scanning and intelligent capture for paper returns, payments and correspondence	SoftTrac software suite
29	*Paper Processing – TACS (Total Automated Capture System)*	Automated data capture for individual income tax returns filed on paper	IBM Datacap, ASP.NET, C#, Visual Basic, Windows Server
30	*Paper Processing – KFI (Key From Image)*	Facilitates manual keying of all paper returns except for Form 760 (individual -- processed by TACS). Human operators view scanned images and key all information by hand	IBM Datacap, C#, VBScript, Oracle Database, Windows/Linux Server
31	*Paper Processing - Remit*	Remittance processing	ImageVision/Vision IP, Windows Server
32	FaxCom	Data capture for faxed returns and correspondence (previously RightFax)	FaxCom software suite
33	*FileNet (IBM)*	Content management and imaging – store images and metadata and provide connections to multiple IRMS apps to view images ; image storage center for all paper processed by VA Tax	IBM FileNet, Visual Basic, Linux Server

	Application	Description	Enabling Technologies
	CACSG (Computer Assisted Collection System for Government)	**Main group of applications for collections**	
34	*CACSG-TAX*	Collections application with a real-time connection to AR.	PowerBuilder, Cobol, Oracle Databases, Linux Server
35	*CACSG-CDCO*	Supports billing and processing for court debt collections unit. Uses debtor information from VA court systems to generate correspondence, initiate legal actions (e.g. lien sourcing), and facilitate financial assessments	PowerBuilder, Cobol, Oracle Databases, Linux Server
36	*CACSG-WebApp for Collection (CWA)*	Field bill payment collections	Java Springboot, Oracle Database
37	*CR (Compliance Repository)*	Data warehouse aggregating IRS, TAX, and other state agency data. Serves as the primary database for selection and processing of audits.	PowerBuilder, Informatica, Trillium, Oracle Database, Linux Server
38	*PASS (Professional Audit Selection System)*	GUI-based application allowing audit selectors to define models against data in CR to generate sets of potential audit candidates	PowerBuilder, Oracle Database
39	*Field Audit – Audit Workbench (VFACT)*	Desktop application for field auditors. Supports offline, on-site auditing workflows for withholding, communication, corporate income, and sales & use taxes	Angular, Java Springboot, Oracle Database
40	*Field Audit – STAUDN*	Audit case management (In process of migration to VFACT)	Visual Basic
	Customer Communications	**Main group of applications for customer communications**	
41	*Siebel - Customer Relationship Management*	CRM used by contact center	Siebel CRM, Visual Basic, jQuery, Oracle Database, Windows/Linux Server
42	*Siebel – Audit Case Management*	Audit case management (In process of migration to VFACT)	Siebel CRM
43	*EESMC (External Entity Secure Messaging Center)*	Localities and external agency login using EESMC for file transfers and documents	Jboss Seam, Java, JSF, Oracle Database, Linux Server
44	*Cisco Phone System – VOIP*	Voice over IP	Cisco Finesse, VMWare
45	*Cisco Phone System – Voice Response Unit (VRU)*	Virtual assistant for VOIP	Cisco COTS
46	*Cisco Phone System - Teleplan*	Phone IVR System	
47	*Verint*	Call quality management software, balances call queues	Verint, SQL Server, VMWare, Windows Server

	Application	Description
1	*PowerBuilder*	Software Development tool for AR Development
2	*Java*	Software Development tool for VTOL applications
3	*ColdFusion*	Software Development tool for VTOL applications
4	*PowerBI*	Software Development tool for Reports - Open source no cost)
5	*Angular*	Sottware Development tool for VFACT development
6	*Informatica - Interfaces*	Software Development tool for interfaces/reports
7	*COBOL - Interfaces/AR*	Software Development tool Interface & AR
8	*Trillium - Address Validation*	Software tool for address validation
9	*Twilio - Two Factor Authentication*	Two factor authentication for Online Portal
10	*DUO - Two Factor Authentication*	Two factor authentication for AR Web
11	*Tivoli - Nightly Batch Management*	Nightly Batch Cycle
12	*Site Improve*	Used to monitor and gather stats for VTOL
13	*VERINT Premium Support*	Call quality management and adherence
14	*Oracle - DataBase*	Oracle database
15	*Oracle GoldenGate*	Data Lake data ingestion tool / PowerBi / Reports
16	*NAS (Network Attached Storage)*	Network Attached Storage
17	*Nitro Pro*	PDF Tool Used by Field Auditors
18	*Splunk - Log management*	Error log management monitoring and dashboarding
19	*CyberArk*	Password Vaulting
20	*iServer - Enterprise Architecture*	Enterprise Application tool
21	*Vision IP*	
22	*VOIP CISCO Infocast*	
23	*Axway*	Sending / Receiving files from IRS
24	*InfoPoll*	Bar Code generation for Batch mailing & remittance
25	*IBM Datacap*	Content management for paper returns
26	*Visual Basic*	Software Development tool for eFile and CRM

Figure 52. Virginia Tax Inventory of Core and Related Applications and Interfaces



6.5 Impact of Security Limitations with current state IRMS

Virginia Tax is facing major security risk due to the legacy technology and solution architecture of IRMS. The impacts are outlined below:

- Identity and access management (IAM) for Advantage Revenue fails to meet current security standards, introducing risk across the IRMS application landscape and making Virginia Tax vulnerable to breaches
  - User authentication cannot be handled via Active Directory or leverage SailPoint or other modern access management tools, as other Virginia Tax applications do
  - Cannot implement single sign on (SSO), password rule enforcement or centralized, automated provisioning, introducing the risk of delays to accounts being terminated upon employee termination
  - Password management does not meet current storage and encryption standards
- Role based access control and account management is based on workgroups and lacks granularity necessary to ensure adequate segregation of duties (SoD); IRMS' dated technology limits adequate detection or prevention of unauthorized access
  - User group structure that forms the basis of IRMS account access allows for SoD violations and requires manual analysis to minimize SoD issues
  - System activity logging and reporting doesn't support meaningful analysis of activities to ensure SoD violations are not occurring
  - Segregation of duties is not implemented among the developer staff
- AR's workstation-based configuration, with sensitive data stored on the workstations is vulnerable to inappropriate access, posing security risks and requires additional security measures such as browser monitoring which further exacerbate the risk due to unencrypted storage
- IRMS limitations related to system age and customization inhibit standard security activities
  - Event and activity logging is performed, but the output doesn't sufficiently support event detection and prevention; some logging is too detailed, resulting in excessive data to extract meaningful event information; some logging is not detailed enough, failing to provide the information needed to efficiently identify events; due to the dated technology, it is difficult to identify the rules to make logging more usable and valuable
  - Comprehensive vulnerability scanning is performed by Virginia Tax and VITA, but because of the dated IRMS technology, scanning and other tools cannot be fully utilized, and overall implementation requires workarounds
- Making security changes is difficult and time-consuming, due to IRMS technology limitations and resource constraints
  - Necessary security changes are weighed with necessary business changes, delaying high priority remediation
  - When a change is necessary, like a recent request for improved password management, it requires many modifications across related systems, which takes excessive time and coordination

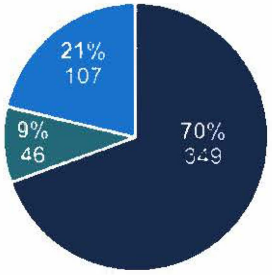
- IRMS' dated technology makes IRS Publication 1075 compliance difficult
  - AR is unable to flag Federal Tax Information (FTI) data in accordance with IRS requirements
  - Do not meet IRS standards for Access Management and least privilege, because IRMS/AR cannot leverage SailPoint or other modern tools
  - Siebel is reliant on Internet Explorer 11, which is at end of life
  - Over-logging of system events (logs that include extraneous information, such as taxpayer SSNs) that are unencrypted and retained for seven years
- Contact center 2-factor taxpayer verification from Accurint-Lexis Nexis is cumbersome and causes poor taxpayer experience; team is looking for a better security around who they're talking to and be less cumbersome and still robust and secure around account setup and access (e.g., IRS (show license, etc.))
  - The Department would like to provide legitimate taxpayers additional access to their tax accounts to improve customer service and customer satisfaction, further increasing the challenge of securing taxpayer data
- Current system challenges do not allow for implementation of sufficient internal controls; a retired Compliance Supervisor and two Virginia Tax employees were able to misappropriate $1.3M dollars by manipulating the system
- Tax Departments nationwide are a highly desirable target to for cyber criminals; cybercrime methods and techniques continue to evolve in an attempts to gain access to sensitive tax information and potentially manipulate tax systems for financial gain

6.6 Maintenance and Enhancement Volume and Backlog

IRMS was developed over twenty years ago and has become more and more difficult to support, with increasing maintenance and operational issues, legacy platform, integration complexities and staff retention/attrition challenges. The technical debt has increased over this time preventing Virginia Tax to move at the speed of business.

- Current Technical Debt (502 total changes/defects) for the major systems within IRMS lies within the PowerBuilder technology. This category makes 77% of the total changes/defects.
  - Advantage Revenue: 349 changes/defects i.e., 70% of total
  - Compliance Systems: 46 changes/defects i.e., 9% of total
  - Others: 107 changes/defects i.e., 21% of total
- Current Technical Debt aging is greater than 1 year for nearly two-thirds (325) of changes/defects
  - Nearly 200 changes/defects have aged over 2 years
  - Aggravated by limited staff with appropriate skills to manage technical debt
  - This is causing the technology team to just focus on the legislative changes

Current Technical Debt



Percentage of defects aging more than...			
100 Days	*250 Days*	*1 Year*	*2 Years*
95%	78%	65%	37%

Gartner.