VIRGINIA TECH

Deloitte.

IT Assessment and Security Review

Future State Recommendations Report and Implementation Roadmap |
Submitted on December 3rd, 2021

DRAFT – For discussion purposes only

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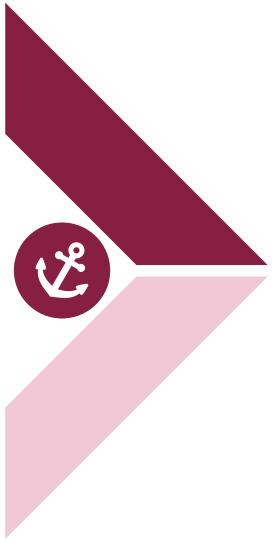
Executive Summary

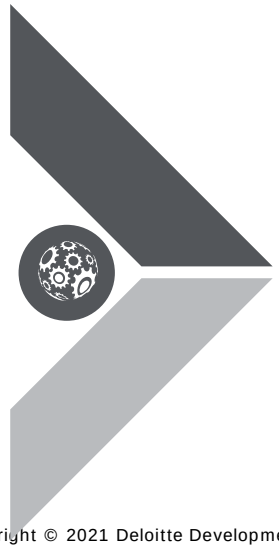
The Imperative for Change

Based on the current state challenges, three focus areas are emerging to shape the roadmap for establishing a more secure and effective future state IT Operating Model for Virginia Tech.



Strengthen the Core

VT's initial focus must be on reducing risk while bolstering the organization and capabilities of Division of IT to cultivate greater institutional trust and improve morale through the delivery of reliable, cost-effective core infrastructure and services.



Build a Culture of Collaboration

In parallel, VT must establish a shared vision for IT, including defined roles and responsibilities for central and distributed IT units to proactively collaborate through a clear governance model.

Foster Innovation and Efficiency

Ultimately, VT needs to focus on enhancing the student, faculty, staff, and research experience by implementing efficient, effective, timely, and innovative services across the Institution.

Guiding Principles

Transformation at VT requires executive support, cross-campus change management, and the ability to demonstrate improvement in efficiency, effectiveness, and information security, anchored in the academic and research mission of the University.

Apply a VT-wide lens to problem statements, bringing a strategic vision of IT as an enabler of the institution's mission (at the University level), evolving from a more transactionally focused central-IT mindset

Maintain the culture of innovation and entrepreneurship throughout the units and colleges, with central IT serving as a solution provider for commodity needs across the institution, enabling the strategic and specific needs of units

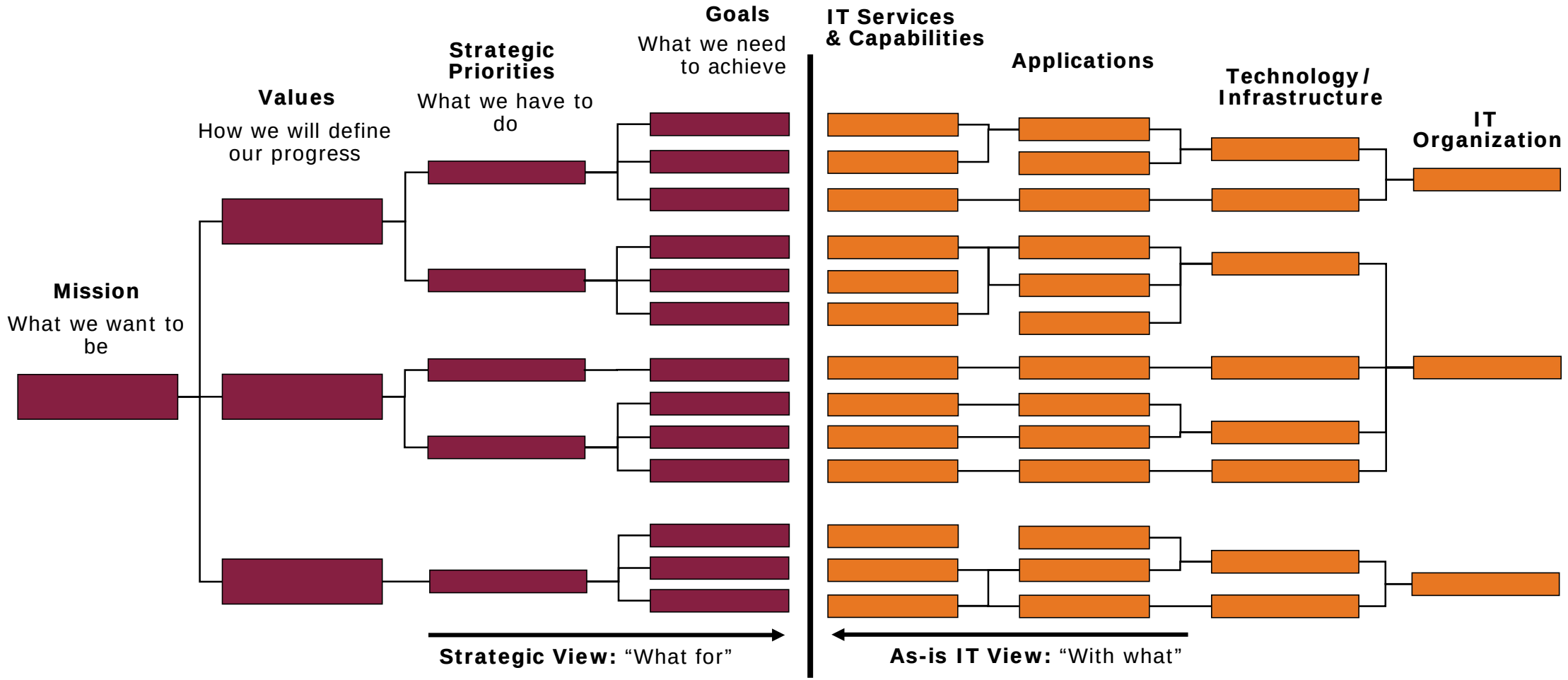
Adopt a culture of change management and communications to bring everybody along for the journey from Day 1

Maintain strong partnerships with academic, administrative, and research units throughout the transformation journey

Reduce the complexity of the IT operating model and adopt a customer perspective when clarifying roles and responsibilities among central, college, and unit IT groups

IT at Virginia Tech

Ultimately, any transformation of IT at Virginia Tech should be in service and alignment with advancing the institution's mission, priorities, and goals and the needs of students, faculty, staff, and researchers.

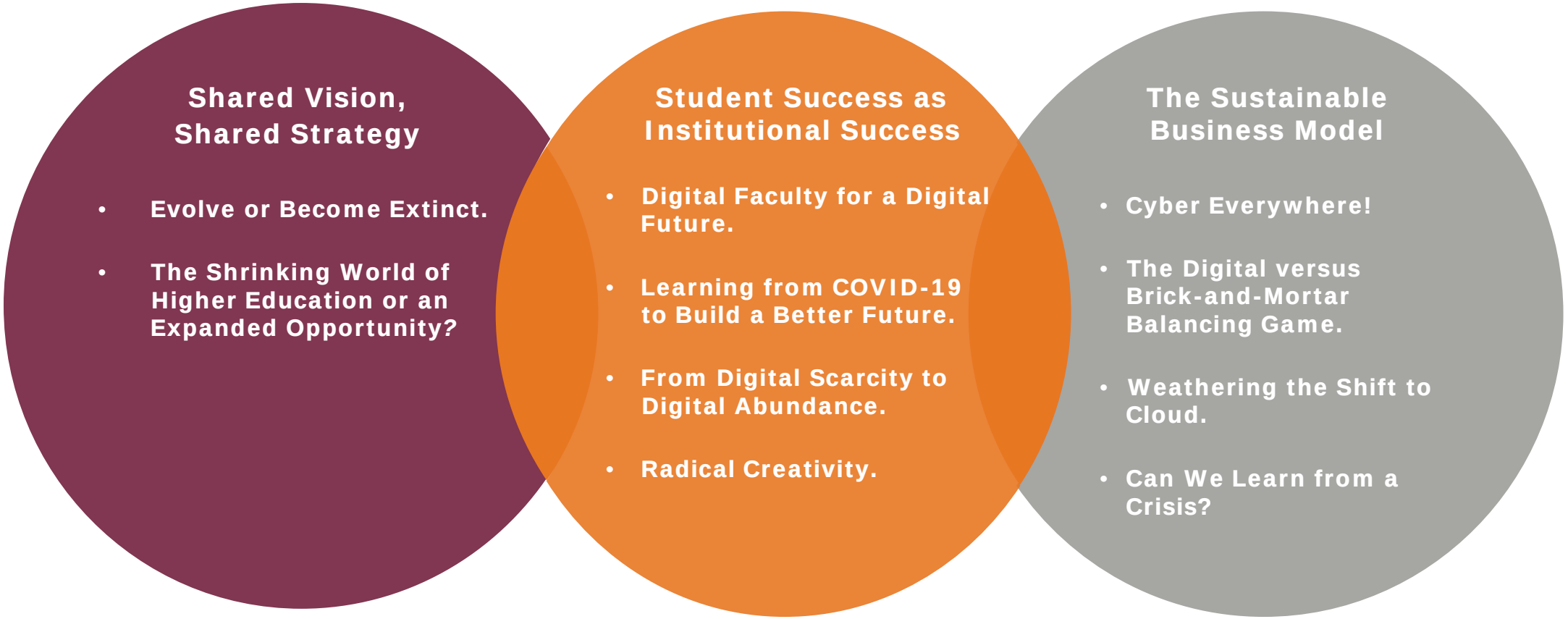


"IT Strategy Tree" model maps the University's goals against the capabilities of IT

Trends in Higher Education

The challenges and opportunities for Virginia Tech are common among peers in higher education, with cybersecurity and evolving to a more digital organization ranking as the top issues across all categories.

EDUCAUSE Top 10 IT Issues 2022*



*Source: Educause Top 10 IT Issues, 2022

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Imagine If….

Imagine if the transformation of IT across VT could enable a best-in-class experience for VT's diverse stakeholders.

- **Imagine if**…there was a self-service portal for obtaining data so administrators, faculty, and researchers can make smarter data-led decisions and conduct research.
- **Imagine if**…faculty and staff could obtain desired software when they needed it at a reasonable cost without feeling the need to build it themselves, compromise on governance, or circumvent security review.
- **Imagine if**…there was a single easy-to-use communication platform that VT could use to communicate to various constituents through their preferred mediums in real-time.
- **Imagine if**…there was greater transparency of roles and responsibilities, enabling individuals flexibility and autonomy to guide their career goals entirely within VT.
- **Imagine if**…students could leverage a modern and intuitive platform to register for classes and plan their course selection throughout their University experience

Summary of Recommendations

The following set of foundational recommendations will enable VT to transform its IT operating model to achieve the future state vision.*

1. IT Governance

1.1 Define the University-wide IT Operating Model to clarify roles and responsibilities for IT across VT.

1.2 Establish a University-wide IT governance model to enable greater collaboration, transparency, and mission alignment in IT.

1.3 Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods.

2. IT Finance

2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

2.2 Streamline software procurement process to expedite acquisitions and improve the customer experience.

3. IT Talent

3.1 Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities.

3.2 Standardize job classifications for IT staff across VT to improve career pathing, training, and performance & compensation management.

4. Technology Capabilities

4.1 Enhance Data Governance to enable greater access, reporting, quality, and clarification over data roles and responsibilities.

4.2 Deploy a common integration layer to enhance data sharing across systems.

4.3 Rationalize application portfolio across VT.

4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities.

4.5 Define strategy for effectively adopting managed services and SaaS solutions.

5. Service Management

5.1 Implement University-wide configuration management database (CMDB) processes and tools.

5.2 Enhance maturity of core IT service management (ITSM) processes to enable service delivery and improve the customer experience.

*Note: Cybersecurity recommendations provided as a separate deliverable

Summary of Recommendations

Recommendations are aligned to current state assessment finding areas, taking into consideration the guiding principles and ongoing VT initiatives impacting IT.

Recommendation		Summary	Benefits
1. Governance			
1.1	Define the University-wide IT Operating Model to clarify roles and responsibilities for IT across VT.	Articulate clear roles and scope of services provided by the Division of IT, and distributed IT service providers across VT.	Provides for a cohesive and coordinated operating model that clarifies authority over various services, creates efficiency and consistency in the customer experience, and allows for distributed IT groups to focus on value-added services for end users.
1.2	Establish a University-wide IT governance model to enable greater collaboration, transparency, and mission alignment in IT.	Establish and define a coordinated governance model to facilitate effective IT decision-making and establish clearer decision escalation and communication paths between groups.	Promotes transparency and effectiveness through a clear and comprehensive interaction model among groups comprised of the right people to make business, IT, and financial decisions around IT projects, standards, and priorities.
1.3	Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods.	Standardize University-wide IT project management and IT enterprise architecture capabilities to provide clear oversight of VT-wide IT initiatives and facilitate development of University-wide standards, frameworks, and principles.	Provides clarity over foundational IT disciplines that are either immature or not well understood, allowing for consistent and effective project implementation across VT.

Summary of Recommendations

Recommendations are aligned to current state assessment finding areas, taking into consideration the guiding principles and ongoing VT initiatives impacting IT.

Recommendation		Summary	Benefits
2. Finance			
2.1	Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery.	Centrally fund more IT services provided by DoIT, simplifying cost-recovery, promoting standardization, and encouraging greater use of DoIT services.	Provides opportunities to reduce cost-recovery administration and increase standardization of solutions while creating a base-line set of services for all customers.
2.2	Streamline software procurement process to expedite acquisitions and improve the customer experience.	Define a standardized procedure for procuring IT goods and services, improving category management, contract management, and IT spend reporting.	Creates a unified customer-oriented approach to IT procurement and aligns policies and processes to support the strategic sourcing of IT goods and services.
3. Talent			
3.1	Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities.	Design a future state Division of IT organization that can more nimbly make decisions and execute projects more efficiently with improved consistency.	A revised organization structure can improve understanding of IT org role arrangement, communications, and responsibilities throughout DoIT; it enables more effective and efficient coordination and use of resources by streamlining duplicative functions and addressing functional gaps within DoIT.
3.2	Standardize job classifications for IT staff across VT to improve career pathing, training, and performance & compensation management.	Develops a systematic framework for roles to be defined, types of responsibilities to be managed, and methods for compensating and developing careers as a VT IT professional.	Sets expectations for IT workforce that provides compensation transparency and empowers employee career growth and training opportunities in an industry increasing in competition; reduces/eliminates unplanned cross-institution talent migration.

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Summary of Recommendations

Recommendations are aligned to current state assessment finding areas, taking into consideration the guiding principles and ongoing VT initiatives impacting IT.

Recommendation		Summary	Benefits
4. Technology Capabilities			
4.1	Enhance data governance to enable greater access, reporting, quality, and clarity over data roles and responsibilities.	Establish a standardized data governance policy and update the data access/request process for VT.	Defines data governance and matures data warehousing capabilities to assist in data quality and availability, and research data management University-wide.
4.2	Deploy a common integration layer to enhance data sharing across systems.	Establish a standard platform for integrating common data among disparate systems and applications.	Adopts a single middleware application to improve application functionality through data consistency across distinct application environments.
4.3	Rationalize application portfolio across VT.	Create a catalog of University-wide and college-specific applications to identify approved systems and duplicative functionality across IT units.	Eliminates redundant, unsupported software applications and deploys modern applications to meet unmet user needs in a way that is centralized and secure.
4.4	Establish data center consolidation strategy and explore enhancing cloud capabilities.	Rationalize the need for separate data centers across IT units to determine proper consolidation in centralized facilities and/or cloud storage environments.	Creates cost efficiencies for data storage through economies of scale and establishes centralized solutions for IT Units.
4.5	Define strategy for effectively adopting managed services and increased “SaaS” solutions.	Maturing already implemented solutions and exploring services to manage processes from a University-wide level.	Increases effectiveness of IT management and standardizing processes to create a wholistic view of services.

Summary of Recommendations

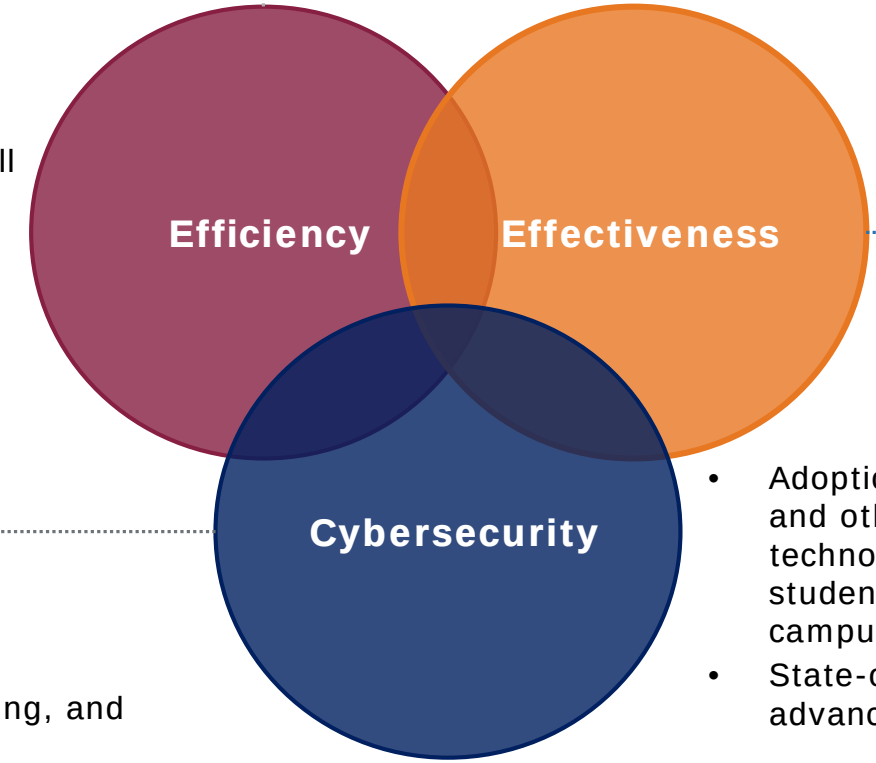
Recommendations are aligned to current state assessment finding areas, taking into consideration the guiding principles and ongoing VT initiatives impacting IT.

Recommendation		Summary	Benefits
5. Service Management			
5.1	Implement University-wide configuration management database (CMDB) processes and tools.	Implement CMDB system and policy to improve tracking of IT assets to reduce risk, increase visibility, manages costs, and enable capacity planning.	Increases accuracy in data to plan renewal and replacement investments, increases efficiency by streamlining Asset Lifecycle Management strategy and tracking all VT IT assets from deployment to retirement, and decreases likelihood of security risks from mismanaged or forgotten assets.
5.2	Enhance maturity of core IT service management (ITSM) processes to enable service delivery and Improve the customer experience.	Identify improvements to the ITSM tool that will provide cross-campus consolidation opportunities and provide a foundation for additional capabilities outside of ITSM.	Improves effectiveness through improved usability of the tool and sets the foundation for adding key features within the ITSM platform.

Transformation Benefits

By taking the steps necessary to transform its IT Operating Model, VT can expect to achieve the following benefits relative to its current strategic priorities.

- Streamlined service delivery that reduces duplicative services and creates a common IT experience for all customers.
- Improved collaboration and transparency in decision making.
- Investments and processes that save VT time and money.

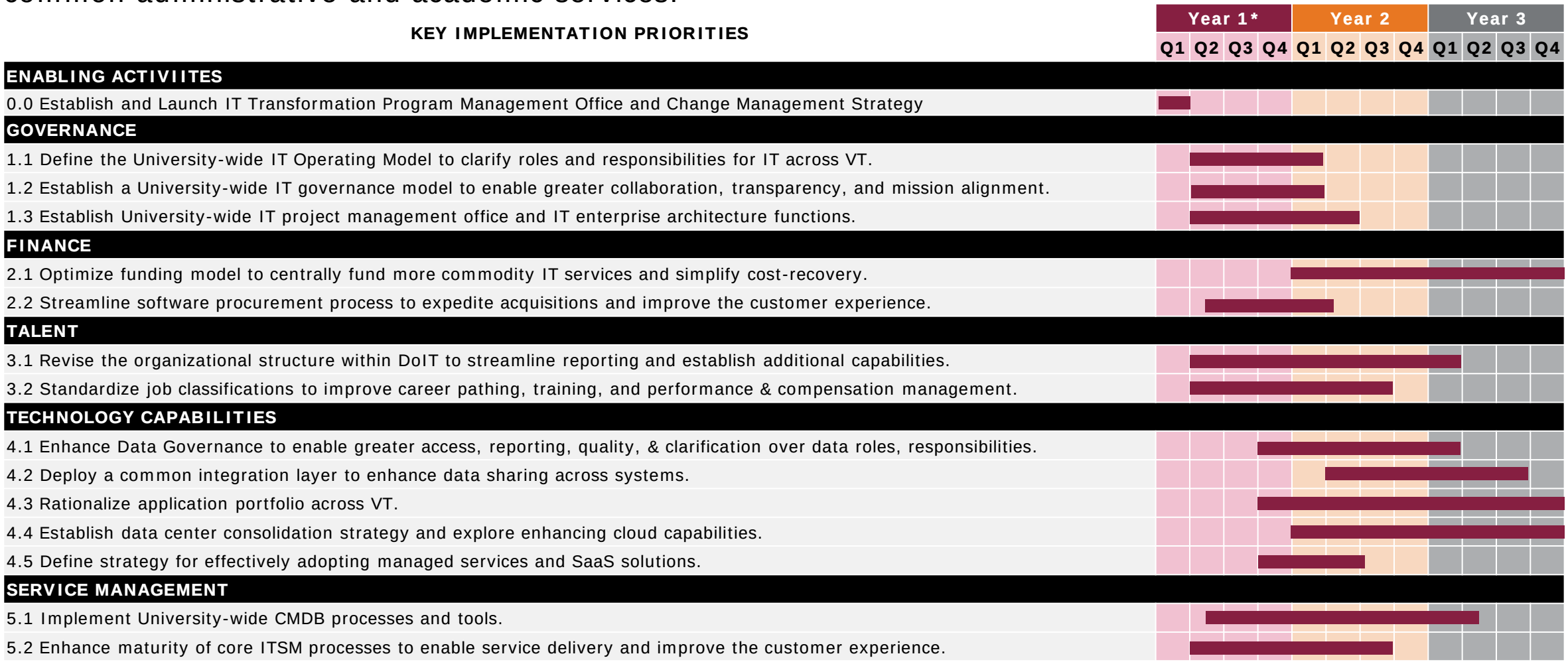


- Adoption of cloud, advanced analytics, and other leading-edge practices and technology capabilities to transform the student experience, catalyze a digital campus, and advance the future of work.
- State-of-the-art services for faculty to advance research and teaching.

- Stronger data protection.
- Improved monitoring, detection, alerting, and response capabilities.
- Decrease risk of damage to VT reputation, disruption of services, and associated costs.

High Level Implementation Plan

VT should realign the IT operating model and strengthen the foundation of IT services before rationalizing common administrative and academic services.



*Note: Timeline represents a calendar year with an assumed start date of Monday January 3rd, 2022

KEY: Implementation Timeline

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Introduction

IT Assessment and Security Review Overview

The objective of the assessment is to review and evaluate the current information technology (IT) & cybersecurity environment and provide recommendations and a roadmap for improving and aligning IT capabilities to meet the strategic needs of Virginia Tech (VT) students, faculty, researchers, and staff.

Phases

CURRENT STATE ASSESSMENT

Will focus on understanding the current state of each area in scope through interviews, detailed documentation reviews, and extensive qualitative and quantitative analysis of governance, finance, talent, infrastructure, applications, service management data, and cybersecurity.

FUTURE STATE DELIVERY MODEL

Defines a recommended future state for VT that addresses identified gaps and risks from the Current State and leverages best practices from benchmarking in higher education that can be undertaken in the short, medium, and long term.

IMPLEMENTATION ROADMAP

Identifies the prioritization, sequence, resources, risk/dependencies, and other considerations necessary to achieve the identified future state.

Current State Assessment → **Future State Delivery Model** → **Implementation Roadmap**

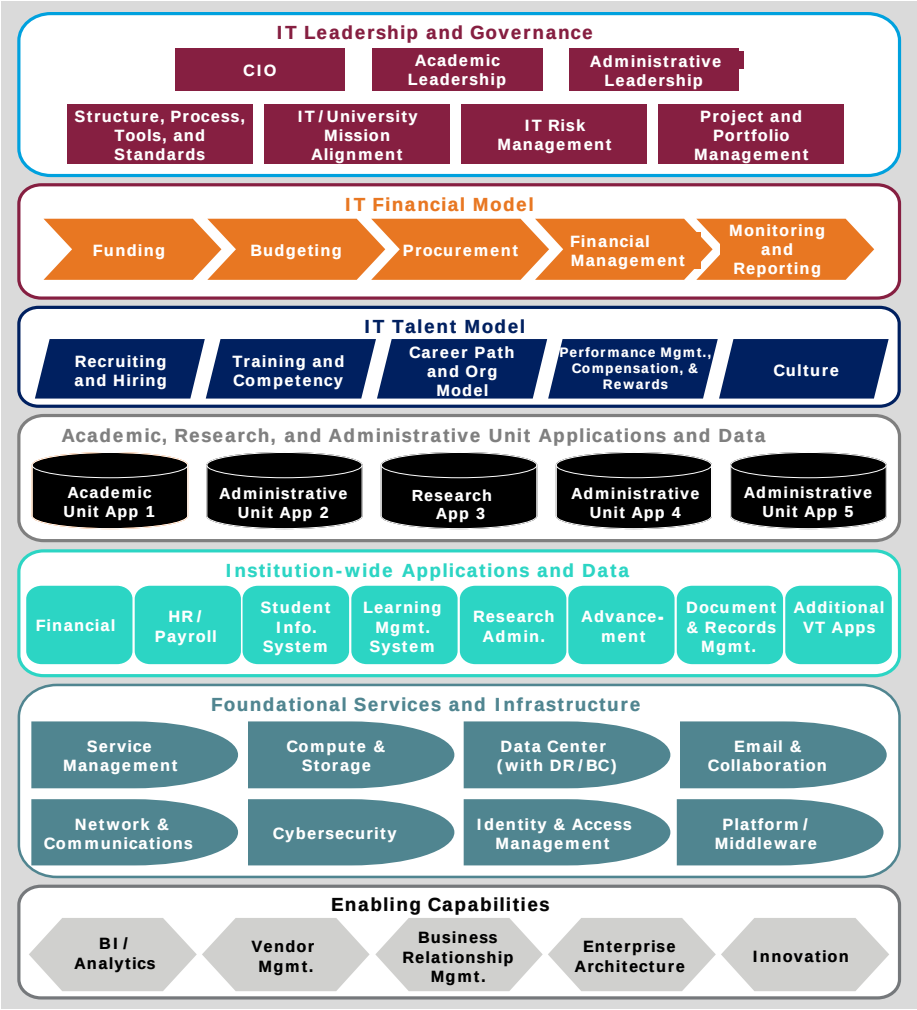
Focus Areas

1. IT Governance
2. IT Finance
3. IT Talent Management
4. Technology Capabilities
5. IT Service Management
5. Cybersecurity Review*

*Note: Cybersecurity recommendations provided as part of separate deliverable

Application of the IT Transformation Framework

For this assessment, Deloitte references an IT operating model framework for higher education to systematically evaluate the IT operations across the institution.



- **IT Governance:** Practices that support effective IT and data oversight, strategic direction, decision-making, risk management, and coordinated budgeting across the organization, with clear roles and responsibilities defined across federated and central IT.
- **IT Finance:** Functions that establish effective financial planning and oversight, funding, and controls for IT spending across the organization.
- **IT Talent:** Functions that support talent growth, retention, and attraction, inclusive of an effective organizational design and supporting culture.
- **Technology Capabilities and Services:** Foundational technologies – including infrastructure, cloud, research computing, applications, and data – aligned to leading designs and solutions that support defined services for customer along with the core service management practices to manage those services effectively.
- **Cybersecurity:** Practices and tools that enhance controls and the infrastructure in place to protect information against cyber threats and vulnerabilities, contributing to operational efficiency and cost effectiveness across the institution.*

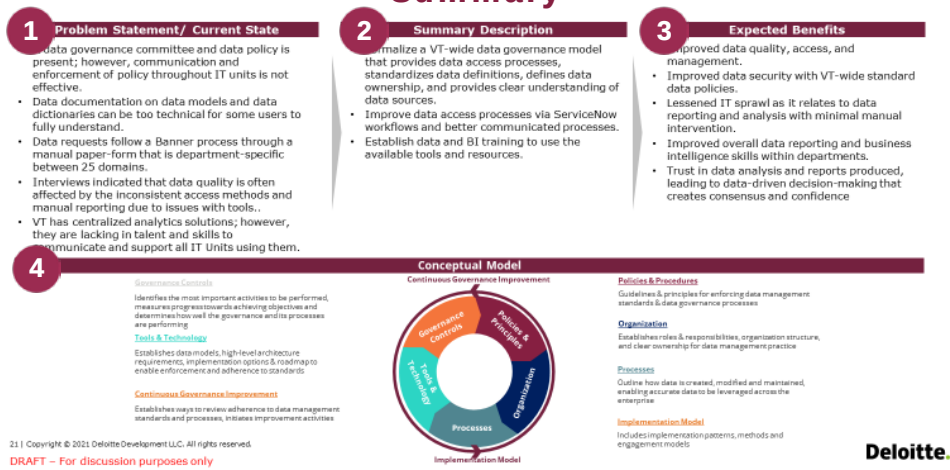
*Note: Cybersecurity recommendations provided as part of separate deliverable

How to Read the Recommendation Slides

Each recommendation follows a common template with key elements.

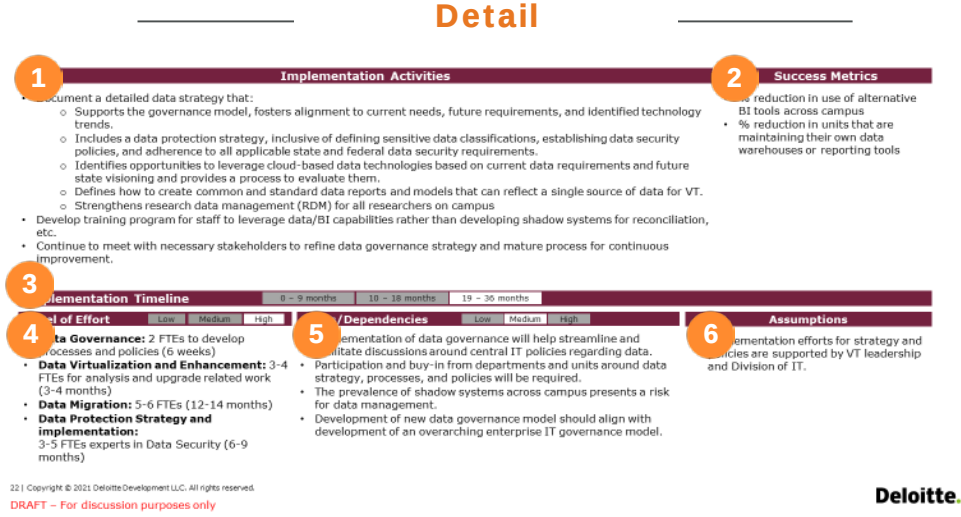
Recommendation Summary

1. Problem statement/current state finding to be addressed
2. Summary description of recommendation activities
3. Anticipated benefits of implementing recommendation
4. Framework outlining how to conceptualize the recommendation or elements of the recommendation



Recommendation Detail

1. Detailed activities required to implement the recommendation
2. Metrics VT can use to measure the benefits of implementing the recommendation
3. Estimated duration of implementation based on current state understanding and similar projects implemented at other organizations
4. Estimated level of effort outlining staff and time allocations for conducting implementation activities and supporting change management where appropriate – staff counts are not necessarily cumulative
5. Estimated impact of risks and dependencies to be considered, anticipated, mitigated, and/or planned for, along with the risk of maintaining the status quo
6. Any assumptions that drive elements of the recommended approach



Following the recommendation summary and detail slides for each opportunity, additional information is provided to aid VT in conceptualizing and operationalizing the opportunity

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Recommendation Classification Methodology

The scales shown below defines how recommendations were assigned to levels of effort, risk, and impact and enabled prioritization mapping for each opportunity. Our estimates of the levels of effort, risk, and impact for each recommendation were based on interviews with Virginia Tech leaders and employees and past Deloitte experiences with similar transformation initiatives.

Effort

Lower Effort, indicates less cross-functional alignment needed, few FTEs needed, and/or fewer stakeholders to be engaged.

Moderate Effort, this could require significant amounts of work hours. dedicated management across areas, 2-3 FTEs needed, and/or multiple stakeholders need to be engaged.

High Effort, could require greater number of dedicated FTEs and senior leader buy-in potentially University-wide.

Low **Medium** **High**

Impact

Lower Impact, less stakeholders impacted, lower amount of change for those impacted, and/or risk/ efficiency/ effectiveness addressed.

Moderate Impact, could significantly change the way work is done for large number of people and/or risk/ efficiency/ effectiveness addressed.

High Impact, systematic change to the way things are done, affects large number of stakeholders, and/or significantly addresses risk/ efficiency/ effectiveness.

Low **Medium** **High**

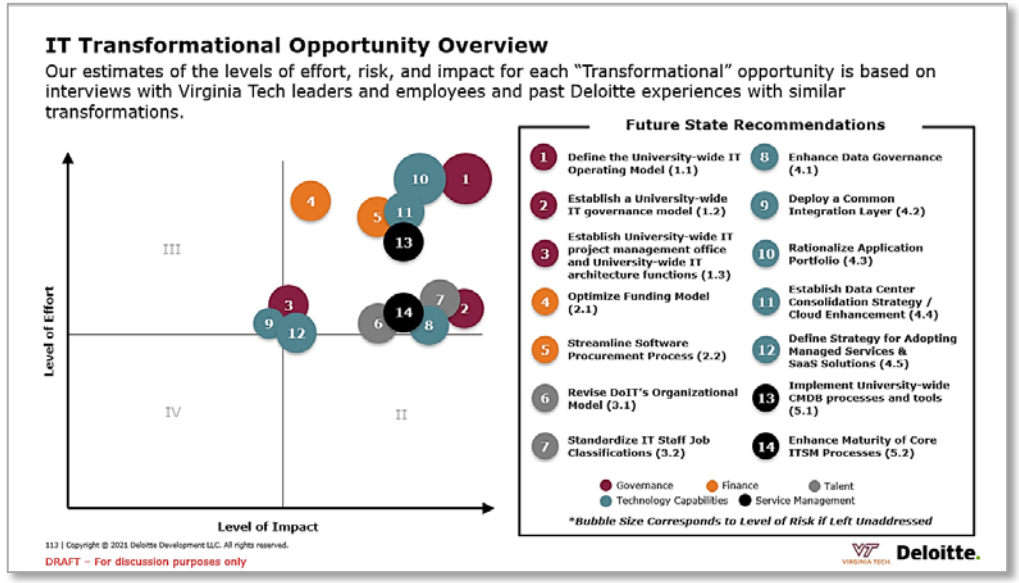
Risk/ Dependencies

Lower Risk, in terms of financial, reputational or long-term strategy obtainment along with minimal dependencies and risk of maintaining status quo.

Moderate Risk, in terms of financial, reputational or long-term strategy obtainment along with moderate dependencies and risk of maintaining status quo.

High Risk, in terms of financial, reputational, or long-term strategy obtainment along with greater dependencies and risk of maintaining status quo.

Low **Medium** **High**



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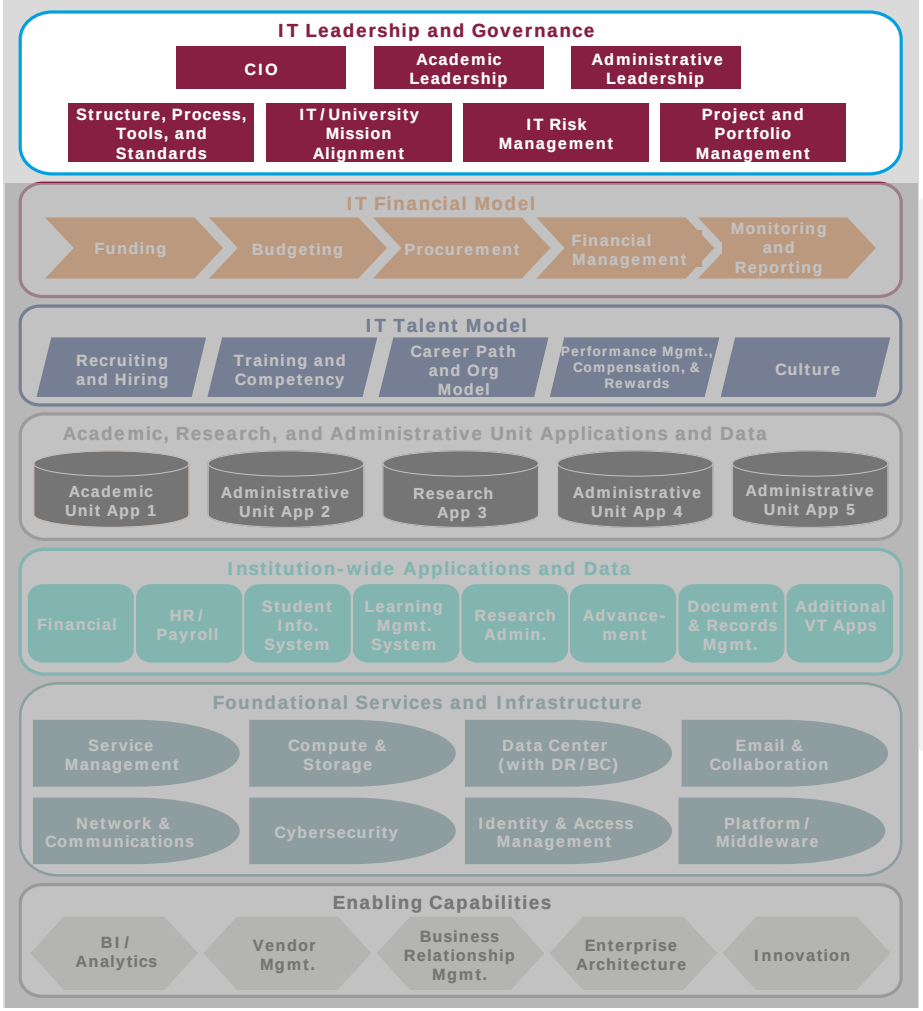
Future State Recommendations


IT Governance

IT Governance Recommendations

A more comprehensive governance model with defined roles and responsibilities supports effective oversight, collaboration, and coordination of IT initiatives across VT



1.1 Define the University-wide IT Operating Model to clarify roles and responsibilities for IT across VT

- Provides for a cohesive and coordinated operating model that clarifies authority over various services, creates efficiency and consistency in the customer experience, and allows for local IT groups to focus on value-added services for end users and clarify roles and responsibilities for IT across VT.

1.2 Establish a University-wide IT governance model to enable greater collaboration

- Promotes transparency and effectiveness through a clear and comprehensive interaction model between groups comprised of the right people to make business, IT, and financial decisions around IT projects, standards, and priorities.

1.3 Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods

- Provides clarity over foundational IT disciplines that are either immature or not well understood across VT, enabling structure over operational and technical IT decision making and direction while promoting use of leading practices University-wide.

1.1 Define the University-wide IT Operating Model to clarify roles

Articulates a clear scope of authority between Division of IT and distributed IT to enhance coordination and accountability in support of a more effective operating model.

Problem Statement / Current State

- The roles of the Division of IT and distributed IT leadership are poorly understood, limiting the ability to champion University-wide IT initiatives and monitor and manage risk.
    - Both within the Division of IT and across distributed units, stakeholders commonly noted difficulty in understanding which groups provided which IT services across the University.
- The scope of responsibilities for distributed IT units varies greatly in terms of services provided, often with overlap.

Summary Description

- Articulate clear roles and scope of services provided by central and local IT service providers (i.e., DoIT and distributed IT) across VT.
- Redefine the roles and responsibilities of distributed IT groups to focus on specialized end-user support and localized needs.
- Redefine the role of the CIO as responsible for facilitating development of University-wide IT strategy and overseeing the operations of University-wide IT governance.
- Empower the role of the CIO and CISO through updated roles and responsibilities—aligning accountability and authority—to make strategic decisions around a defined scope of IT.

Expected Benefits

- Increased coordination of strategy and operations to bolster efficiency and effectiveness at the DoIT and distributed IT levels.
- Greater consistency in the customer experience from reduced fragmentation in services and disparity in support resources.
- Improved culture of IT with clear lanes of operation, allowing for local IT groups to focus on value-adding services for customers.
- Greater insight into and management of risk across VT.

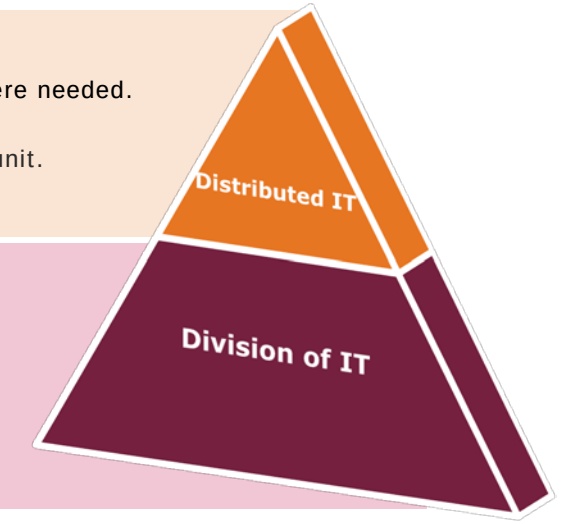
Conceptual Model

Distributed IT

- Supports unit-specific research and pedagogical applications and infrastructure, where needed.
- Embedded in units with faculty and unit staff to seamlessly support their work.
- Enables support for IT needs that are highly specific and specialized to a particular unit.
- Maintains security standards and compliance across users and sensitive data.

Division of IT

- Supports governance and facilitation of a Institution-wide IT strategy.
- Reduces fragmentation in delivering common commodity IT services.
- Provides a shared infrastructure for unit and college-specific IT needs.
- Enables economies of scale and standardization across the University.
- Drives information security and compliance with policies, procedures, and standards.



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1.1 Define the University-wide IT Operating Model to clarify roles

Articulates a clear scope of authority between Division of IT and distributed IT to enhance coordination and accountability in support of a more effective operating model.

Implementation Activities

- Map the full spectrum of services and operations currently under the purview of each IT service provider across VT.
- Identify areas of overlap across IT service providers along with gaps in oversight for which there is no clear authority or owner.
- Define a set of guiding criteria to help map the scope of roles and responsibilities across the Division of IT and distributed IT units.
- Incorporate input from administrative, academic, and research leaders at the executive, college, and unit levels on identified needs and expectations.
- Refine the IT operating model by re-organizing authority over IT services centrally and at unit levels
- Identify and communicate any change in authority in the University's CIO's role and enable authority and responsibility through policy, as appropriate.
- Clarify the role and authority of the CISO.
- Define a technical and staff reorganization plan as appropriate to facilitate any reorganization of technical resources (e.g., infrastructure and applications) and human resources (e.g., staff moving between units).
- Publish updated information and communicate to the University through detailed change management and awareness campaign.

Success Metrics

- Reduction in number of duplicative services University-wide
- Increased adoption of Center for Internet Security (CIS) safeguards

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | Medium | High

- **Role and Responsibility Analysis:** 2 FTEs (2 months)
- **Change Impact Analysis:** 3 FTEs (3 months)
- **Publish and Communicate Changes:** 2 FTEs (1 month)
- **Implementation Note:** May take 1-3 years to fully implement across IT units

Risks / Dependencies

Low | Medium | High

- The possibility of a change in scope of responsibility for the various IT leaders across the University will require significant change management.
- VT leadership at the executive, college, and unit levels need to be highly supportive of the change.
- The effectiveness of newly defined roles and responsibilities can be supported through a more robust IT governance model, a streamlined funding model, and an updated organizational chart for VT IT.
- Completion of Recommendation 3.2, a job architecture study, standardizing role, expectations, and compensation across the University is a critical enabler of this work, and will accelerate the timeline to operationalize.

Assumptions

- This effort will not require a campus referendum to complete.

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1.1 Define the University-wide IT Operating Model to clarify roles

While this discussion of IT operating model focuses on alignment of roles and responsibilities, it is imperative that the other model components (business practices, technology, and data and information) be optimized for effective service to be provided to faculty, employees, and students.

Business Practices

Business norms, processes, and policies serving faculty, employees, and students.

Technology

Effectiveness of technology in enabling efficient and effective support for faculty, employees, and students.

Data & Information

Standardization of data definitions and level of access to accurate, real-time data and reports to enable decision-making.

People & Organization

Training, roles and responsibilities, and governance structures enabling accountability, workforce effectiveness, and change management.

Critical Enablers of a Successful Service Delivery Model:

- High functioning central IT division.
- Clear governance for the model, with defined escalation paths for issues and challenges.
- Clear, documented, and transparent roles and responsibilities.
- Well-trained employees, who bring a problem-solving mindset to their work.
- Technology-enabled electronic processes that are straightforward and utilize workflow.
- Effective training and communication channels for distributed IT staff.
- Timely, accurate access to data at the appropriate levels of the organization.

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1.1 Define the University-wide IT Operating Model to clarify roles

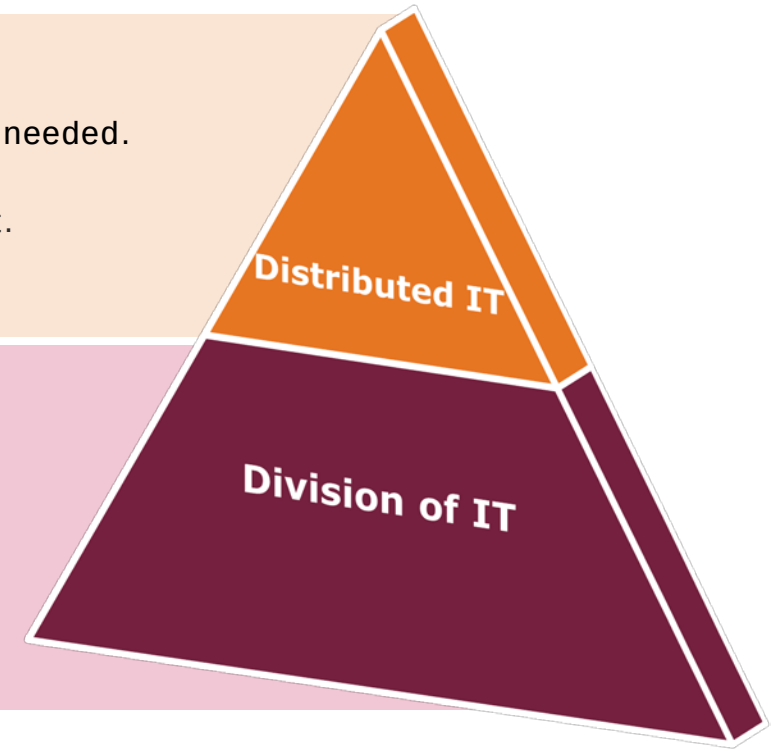
It is important to understand the needs and capabilities at each tier across IT to calibrate the most effective, efficient, and secure distribution of IT services.

Distributed IT

- Supports unit-specific research and pedagogical applications and infrastructure, where needed.
- Embedded in units with faculty and unit staff to seamlessly support their work.
- Enables support for IT needs that are highly specific and specialized to a particular unit.
- Maintains security standards and compliance across users and sensitive data.

Division of IT

- Supports governance and facilitation of a University-wide IT strategy.
- Reduces fragmentation in delivering common commodity IT services.
- Provides a shared infrastructure for unit and college-specific IT needs.
- Enables economies of scale and standardization across the Institution.
- Drives information security and compliance with policies, procedures, and standards.



1.1 Define the University-wide IT Operating Model to clarify roles

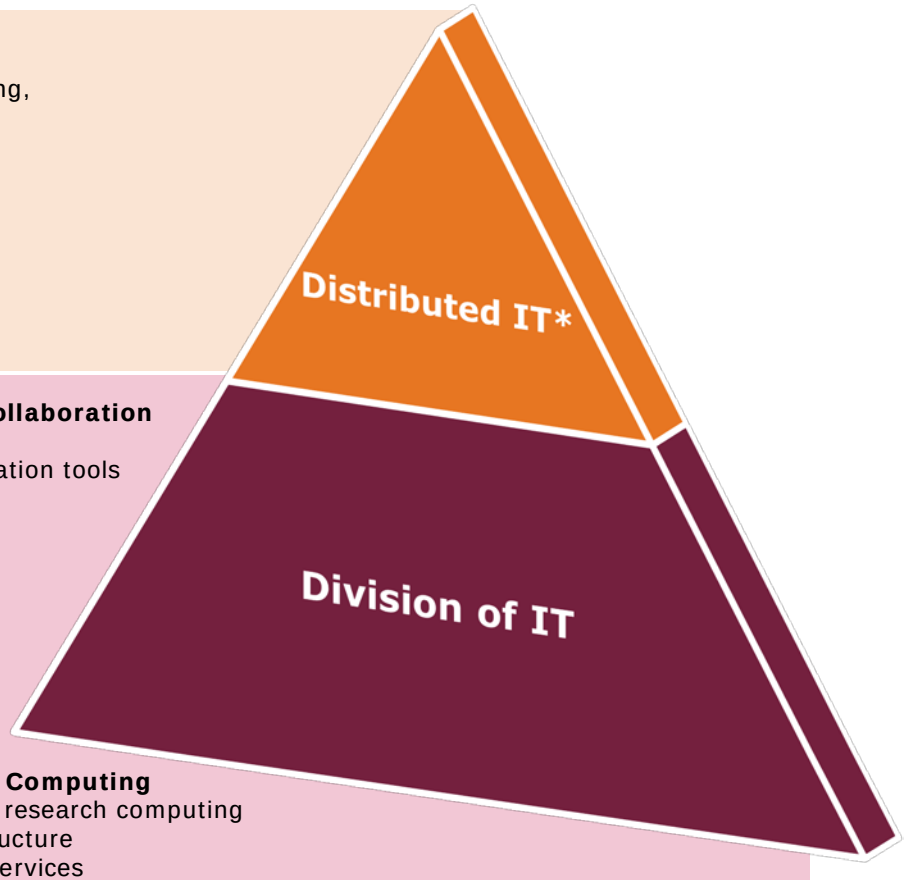
It is important to understand the needs and capabilities at each tier across IT to calibrate the most effective, efficient, and secure distribution of IT services.

The model presented outlines a potential scope of responsibilities across DoIT and distributed IT at VT. Given the volume and diversity of unique applications and services at the distributed level, only illustrative examples are provided for these tiers.

Potential Scope:

College / Unit-Wide Apps: E.g.,
- Industry-specific career services commercial off-the-shelf (COTS) solutions.
- Non-IT inventory management solutions for facilities, capital projects, or lab equipment.
- College or unit-wide Info security policy compliance.

College / Unit-Wide Services: E.g.,
- Shared electronic media storage, hosting, and transfer solutions for units.
- Single tenant administration of a multi-tenant cloud solution.
- College or unit-wide support for applications and technology needs that are specific to that unit.



Strategy, Planning, & Operations
- IT Governance and Risk
- Strategic Planning
- Enterprise Architecture
- Policies and Standards
- University-wide IT PMO
- University-wide IT Finance and Procurement
- University-wide IT Talent

Customer Experience
- Campus Service Desk
- Software Procurement and Licensing

Data & Analytics
- University-wide Reporting and Analytics (technical services)

Information Security
- Identity and Access Management
- Security Operations
- Security Compliance

Teaching & Learning
- Classroom Technologies
- Learning Management System Tool

University-wide Products
- HCM, Finance, SIS
- Student Apps
- Research Admin
- Mobile and Web
- Accessibility

Infrastructure Support
- Network
- Data Center / Storage

Campus Collaboration
- E-mail
- Collaboration tools

Research Computing
- Shared research computing infrastructure
- Cloud services

*Note: Use cases may exist to require further separation of distributed IT units into schools and units (e.g., a research institute within a college that operates their own grant-funded research computing cluster)

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1.1 Define the University-wide IT Operating Model to clarify roles

Realizing the proposed IT operating model would require phasing-in some locally provisioned services into DoIT or expanding the reach of current centralized activities over time. A suggested approach is provided below to notate what might be currently distributed and could be centralized within a new DoIT organizational structure.

Year 1

Strategy, Planning, & Operations
- IT Governance and Risk
- Strategic Planning
- Enterprise Architecture
- University-wide IT PMO
- University-wide IT Finance and Procurement
- University-wide IT Talent

Customer Experience
- Campus Service Desk
- Software Procurement and Licensing

Teaching & Learning
- LMS

Applications
- HCM, Finance
- LMS
- Other related apps

Information Security
- Identity and Access Management
- Security Operations
- Security Compliance
- Security Governance & Policy

Infrastructure Support
- Unified Communications (including email)

Data & Analytics

Year 2

Applications
- Academic Applications (uAchieve)
- Research Admin
- Mobile and Web
- Business Applications (Document Management, Slack)
- ITSM Tool
- Other related apps

Infrastructure Support
- Data Center Operations and DR

Research Computing
- Shared high-performance computing infrastructure
- Research Computing cloud services

IT Strategic Partners

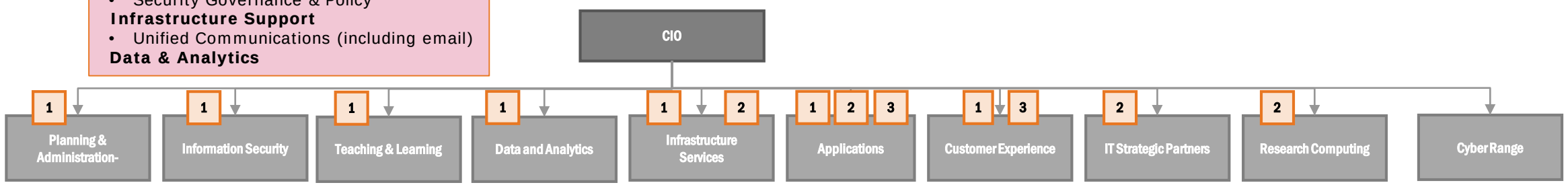
Year TBD*

Customer Experience
- Classroom Technologies

Applications
- GIS

Cyber Range

Alignment to the Proposed Target IT Organizational Model



Key # # indicates the proposed year for transitioning to DoIT

1.1 Define the University-wide IT Operating Model to clarify roles

Realizing a new operating model necessitates changes in how incidents/problems and requests are triaged and delivered. Operationalizing changes in roles and responsibilities should be complemented with enhancements to service and knowledge management to support a seamless customer experience (see recommendation 5.2). An illustrative model is provided below.

Illustrative Model:

Scope of Services

Tier	Service Provider	Service Type Description	Service Examples	Approx. Volume
Tier 1	DoT IT Service Portal	• Portal self-service navigation	• Self-service • Network connectivity/ wi-fi issues • E-mail issues • Device lock-out	~80%
Tier 2	DoIT Help Desk	• Initial end user support requests, standard functionality issues and trouble shooting • Troubleshoot functional and technical application and network communication issues	• Common ERP questions • Laptop issues (e.g., “I spilled coffee on my device and it is not functioning”)	
Tier 3	Distributed IT Support; IT Vendor or Specialist	• Issues that require in-depth analysis and resolution of application and network communication problems by programming and software technical experts	• Unit-specific application issue • SaaS product integration issues	20%

1.1 Define the University-wide IT Operating Model to clarify roles

Redefining the operating model to clarify the responsibilities of DoIT and distributed IT units affords an opportunity to clarify the role of the CIO as responsible for facilitating development of University-wide IT strategy and overseeing the operations of University-wide IT governance. The model below provides common archetypes for a CIO.

CATALYST

Instigate innovation through transformational change to business architecture, strategy, operations, and technology.

STRATEGIST

Partner with academic and administrative units to align University and IT strategies and maximize the value of technology investments.

TECHNOLOGIST

Assess technologies and design technical architectures to increase agility and manage complexity.

OPERATOR

Operate and deliver efficient IT services and solutions to support the University mission while managing risk and protecting core assets.

1.1 Define the University-wide IT Operating Model to clarify roles

The role of IT in higher education has changed over the past decade and is accelerating as we emerge from the pandemic. To step into the role in shaping institutional strategy, CIOs must move from transactional (an operator) to transformational (a catalyst and/or strategist).

Success in the past…	…Success in the Future
Transactional	***Transformational***
ERPs and applications represented systems of record, owned and understood by IT.	We use systems of engagement that vendors increasingly position to campus units as “plug and play” solutions but may still require greater collaboration and integration to realize their benefit University-wide.
CIOs “kept the technology trains running,” by focusing on managing application customization, system administration, infrastructure expansion and data center management.	Effective CIOs step into a role as a strategic partner for the institution – helping functional leaders deliver on institutional mission by leveraging technology.
Institutions invested in infrastructure – hardware, software, network capabilities: focusing CIO time on maintaining and stewarding these resources.	Institutions outsource commodity IT services, creating an opportunity for CIOs to focus time on stewarding innovation in service to the institutions mission.
Software and systems generally received significant investment every 7-15 years, with major upgrades requiring significant investment from University resources followed by a “status quo” period.	SaaS tools are delivered from a multi-tenant (single code line) environment, so upgrades and enhancements are delivered continuously, requiring the University to adopt a “continuous improvement” culture.

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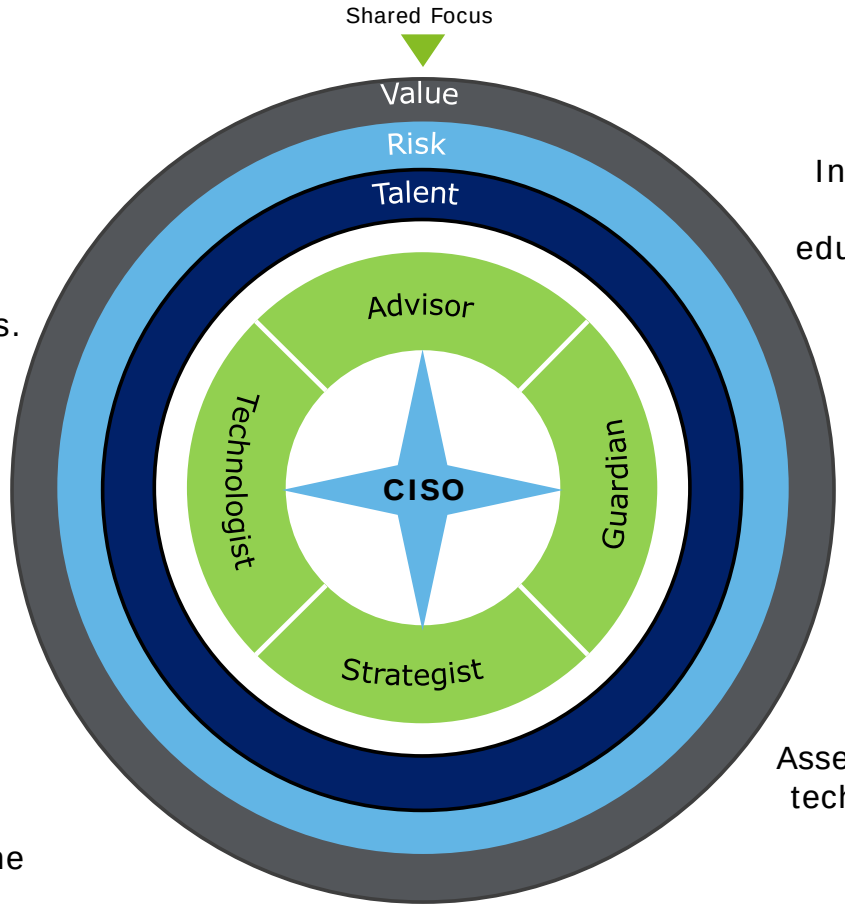
1.1 Define the University-wide IT Operating Model to clarify roles

The role of the VT CISO will also need to be evaluated to determine the degree of oversight and authority they should have over risk across VT. The model below provides common archetypes for a CISO.

STRATEGIST

Drive cyber risk strategy alignment, innovate and instigate transformational change to manage risk through valued investments.



ADVISOR

Integrate with academic and administration units to educate, advise and influence activities with cyber risk implications.

GUARDIAN

Protect the University by understanding the threat landscape and managing the effectiveness of cyber risk program.

TECHNOLOGIST

Assess and implement security technologies and standards to build organizational capabilities.

1.1 Define the University-wide IT Operating Model to clarify roles

Optimizing the operating model facilitates the transition to a more “digital organization” that enables greater efficiency and innovation across the institution. It requires a mindset and a culture change that the CIO can foster by establishing strong partnerships across the institution.

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1.2 Establish a University-wide IT governance model

Define and promote a coordinated governance structure to enable greater collaboration, transparency, decision making and mission alignment in IT.

Problem Statement / Current State

- VT lacks a University-wide IT governance structure that is well understood or effective in facilitating coordination and alignment on shared priorities.
- VT maintains at least 6 groups tasked with some form of advisory, collaboration, or governance mandate but lacks an overarching framework or interaction model by which they are organized.
- There is not a documented rubric or framework for making or prioritizing IT decisions, nor is there a set of thresholds or guidelines that determines the levels (unit, college, University-wide) at which potential University-wide IT decisions are made.

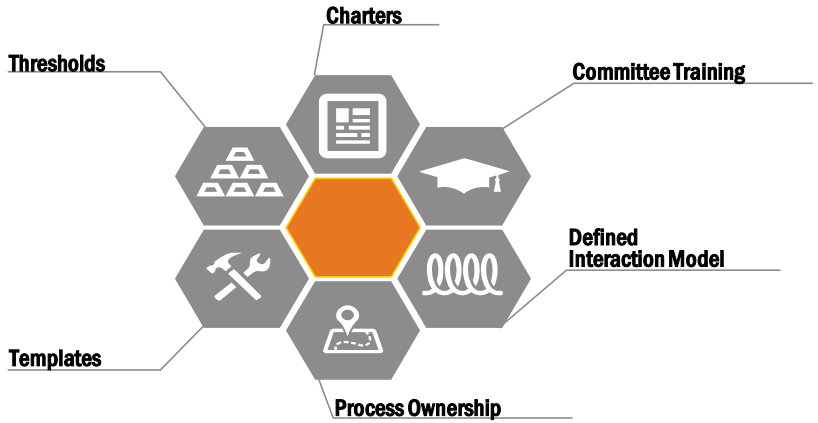
Summary Description

- Enhance the IT governance model through more inclusive membership; domain-focused oversight over research computing, teaching and learning technologies, University-wide applications, and security; and clearer escalation paths between distributed units and University IT governance.
- Re-evaluate current governance groups for effectiveness, and clearly define future roles and responsibilities and levels of interaction within the overall IT governance framework.
- Bolster the governance model with clearly defined processes and tools so that decision making is effective, inclusive, and transparent.

Expected Benefits

- Creates a model that allows the right people to make academic, administrative, technology, and financial decisions around IT projects, standards, and priorities.
- Generates ability to set a clear and effective University-wide IT strategy.
- Produces clear (and transparent) decision rights and process for decision making, coordination, and resource sharing.
- Establishes standards where it makes sense to ease IT delivery, reduce risk, and increase interoperability.
- Creates ability to build and manage the University portfolio of IT investments and assets.

Conceptual Model



1.2 Establish a University-wide IT governance model

Promote transparency and effectiveness through a clear and comprehensive interaction model between groups.

Implementation Activities

- Re-evaluate existing governance committees and groups, including membership/representation, operating guidelines, roles and responsibilities, and interaction models.
- Establish a working group with VT-wide representation to oversee and communicate any changes to the overarching governance model; the University Governance Committee and sub-committees under the Commission on University support may augment this effort.
- Establish process for selecting committee members.
- Define a decision rights framework to facilitate clarity on which committee owns decision rights for which types of decisions and which committees may be providing advisory input only.
- Establish and document the process for governance groups (e.g., operations).
- Define escalation thresholds by which decisions are escalated from distributed IT to DoIT.
- Map alignment of existing governance groups to enhanced governance structure as part of interaction model.
- Develop IT governance tools and templates where not currently in use, inclusive of a tool and process to track decision approval, status, and corresponding initiatives.
- Finalize design of the overarching IT governance model and launch.
- Monitor governance effectiveness and refine model as needed.

Success Metrics

- Establishment of a unified IT Strategic Plan
- # of University-wide IT standards developed
- # of VT leaders engaged in strategic planning process (IT and Non-IT)

Implementation Timeline

0 – 9 months | **10 – 18 months** | 19 – 36 months

Level of Effort

Low | **Medium** | High

- **Governance Mapping and Design:** 2 FTEs (3 months)
- **Governance Establishment:** 2 FTEs (6-9 months)
- **Governance Operations:** 1-2 FTE (Ongoing) Governance requires the support of identified committee members in addition to administrative support to enable the “doing” of governance in addition to the decision making

Risks / Dependencies

Low | **Medium** | High

- Governance is an iterative process that matures and advances over time; it requires stakeholder expectation management and communications.
- Governance membership spans beyond IT – accordingly, business roles and responsibilities for discrete processes may also need to be defined and mapped in order to be successful – accordingly, a new element of administrative and academic strategy coming together to be reflected in a unified IT strategic plan.
- Effective governance is critical to the efficacy of any cyber security program/ efforts.

Assumptions

- Committees will be endowed with the appropriate authority to advise and/or make decisions.
- VT stakeholders will be accepting of changes to IT governance frameworks.

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1.2 Establish a University-wide IT governance model

There are four ways IT governance organizations are typically oriented; this is often a function of organization, maturity, and leadership needs. The proposed model represents a hybrid-approach.

Mission Based

- Governance is established around areas of the organization's mission. This provides a high level of attention to guiding IT's support to specific mission areas. This is typical of more decentralized models.
  - Teaching
  - Research
  - Administration

Customer Based

Governance is established around specific constituencies. This provides a high-touch response that meets the needs of different IT users and providers. This is typical of organizations whose constutuencies are very different and often used in higher education.

- Faculty
- Administrators
- Students
- Research

Service Based

- Governance is established around specific services. This provides emphasis on service management and quality. This is especially useful for less mature service organizations or outsourced service organizations..
  - GIS
  - Network
  - Applications
  - Infrastructure
  - Web

Domain Based

- Governance is established around specific domains. This provides emphasis on integration, coordination and standards. This is especially useful for organizations new to governance.
  - Data
  - Technology
  - Security
  - Services

1.2 Establish a University-wide IT governance model

Universities engage in IT governance using a diverse set of structures and considerations.

Level of Centralization	• **Centralized**-Central IT organization has authority over all areas of IT including assets, services, financial and human resource management, and operations • **Hybrid / Federated-**Authority for IT assets, services, financial and human resource management, and operations is distributed between the IT organization and individual organizations • **Decentralized-** Unit CIOs have authority over all IT areas including assets, services, financial and human resource management, and operations
Areas of Oversight	• **Strategy-**Designs overall IT strategy and direction in accordance with university business strategy • **Investments**-Directs money and priorities for IT investment • **Standards**-Sets standards for domains including data, security, technology, and architecture • **Services**- Enables enterprise services to be the right services and that they are provided up to specific standards • **Project Specific**-Oversees large or important projects
Level of Complexity	• **Streamlined-**1 or 2 executive committees, all other decision making part of ongoing IT operations • **Middle Ground**-Small number of oversight groups, specific areas of focus, regular cadence of handoffs • **Complex**-Many groups, many hand-offs and processes, many decision makers
CIO Selection / Reporting	• **President**-CIO is appointed by the President and/or is a member of the cabinet • **SVP for Administration**-Reports within the administrative side of the university such as Budget, Finance and Administration etc. • **Other-** There is no CIO, or the CIO has an executive director type role, or responsibility is divided
Constituencies Included in IT Governance	• **IT Leaders and Managers**-IT service managers and leaders help drive IT governance • **University Leaders-**University leaders serve in governance processes • **Faculty-**Faculty provide oversight for university IT, and review and prioritize enterprise-wide technology investments • **Students-**Students serve as members of governance groups to foster continuity and congruence of IT strategies with teaching and learning • **Staff-**Staff sit on IT Governance boards to support congruence with staff priorities
Enforcement	• **Strong Authority**-CIO and/or Governance boards have the authority to set and enforce IT standards • **Some Authority**-CIO and/or Governance boards have the authority to set and enforce some IT standards • **Limited Authority**-There is limited authority to enforce standards

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1.2 Establish a University-wide IT governance model

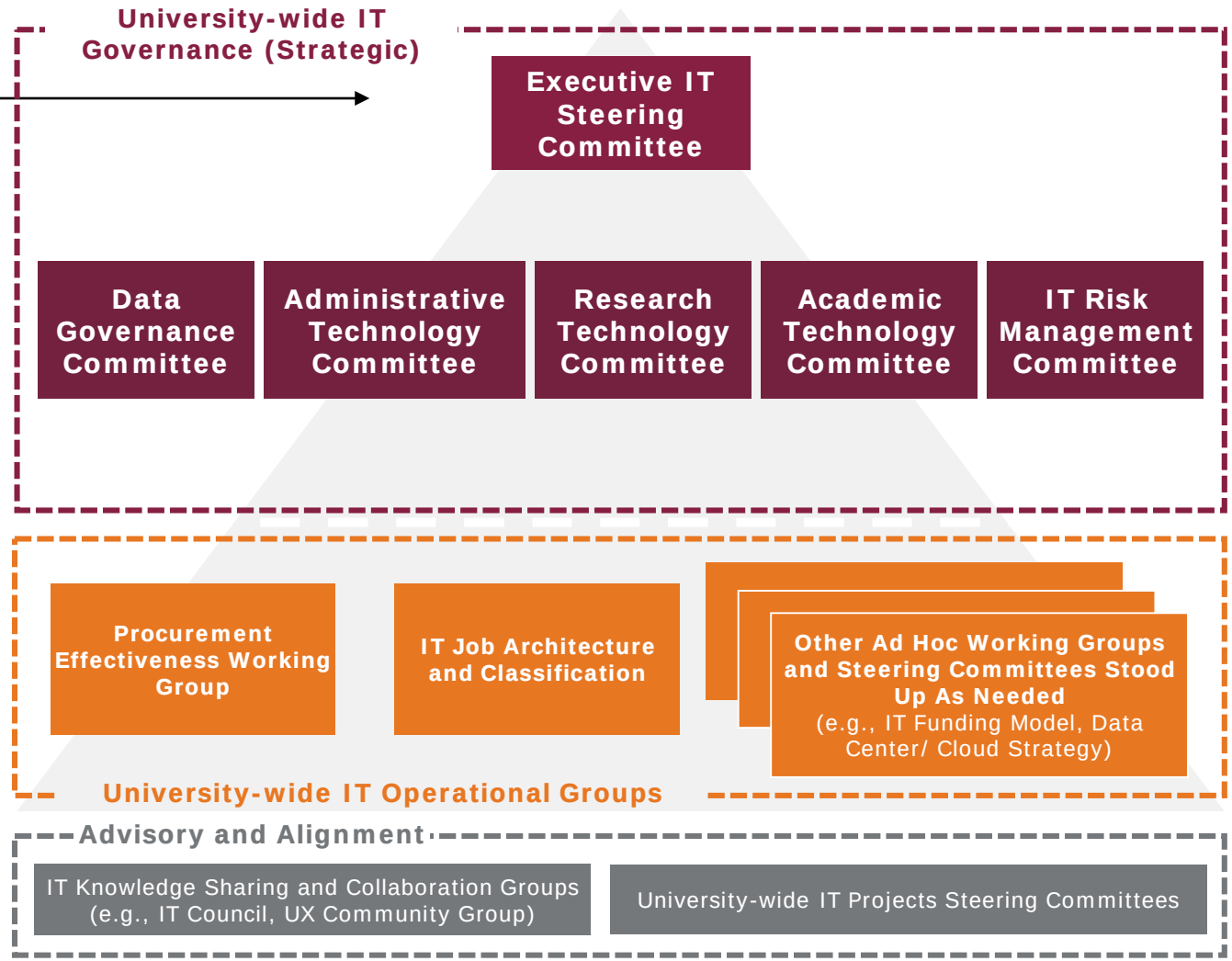
The model below represents a potential design based on effective approaches used by other universities and the priorities and needs of VT.*

The **Executive IT Steering Committee** oversees and makes decisions on University-wide IT strategy, enabling executive-level sponsorship of IT initiatives, deciding on projects above certain thresholds, determining exceptions from approved standards, and providing oversight of IT investments and their impact.

Subcommittees are cross-functional recommendation groups comprised of IT, administrative, and academic representatives that provide oversight, coordination, and collaboration on specific domain and mission-focused areas. These allow for broad stakeholder representation in IT decision making and direction setting.

Working Groups and Steering Committees are operational and provide recommendations to support the development of a common approach to specific domains and functions of IT across VT. Working groups may be standing or ad-hoc and convened to drive standards for processes around specific initiatives and projects (e.g., IT procurement - recommendation 2.2).

Advisory and Alignment Groups may function to identify opportunities or issues to be escalated to IT governance groups, advise on certain decisions, or align on University-wide IT standards.



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Note: Proposed model only. As part of the detailed design, VT should evaluate the effectiveness of current groups that may serve similar roles and consider how they will be migrated/ aligned to the new model.

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1.2 Establish a University-wide IT governance model

A key element of any governance structure is promoting diverse membership with both IT and non-IT staff to facilitate IT/University mission alignment.

Governance Group	Scope	Proposed Membership*
Executive IT Steering Committee	• Facilitates alignment of IT strategy with University priorities and mission. • Decides on projects above certain thresholds. • Adopts IT standards and policies across the University. • Oversees the return on VT's IT investments. • Improves transparency of University IT decision making. • Implements a priority-setting process and accountability mechanisms. • Encourages knowledge and information sharing across the University. • Makes decisions on issues that cannot be resolved by the other IT governance groups.	• **Total: 5-7** *Meeting participation may increase to include representative IT, Research, Academic, and Administrative leadership from subcommittees depending on the topics discussed*
Data Governance Committee	• Reviews and approves data management strategy, standards, and policy. • Promotes/facilitates intra and inter-unit cluster data sets and sharing opportunities, inclusive of opportunities to research data management capabilities and standards. • Advocates for stakeholder data needs and concerns, inclusive of data access and protection.	• **Total: 5-7**
Administrative Technology Committee	• Provides oversight of University-wide applications at VT inclusive of projects, policies, or standards related to finance, human capital management, customer relationship management, student, or other business systems and applications supporting the shared administrative functions across VT. • Streamlines application sourcing and supports ongoing portfolio. management (e.g., identifying applications in the portfolio that can be shared University-wide). • Supports life cycle management for critical system-wide business applications.	• **Total: 6-8** *Meeting participation may increase to include representative IT leadership depending on the topics discussed*

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**Note:* Representative model only; actual participants should be finalized and appointed by VT leadership

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1.2 Establish a University-wide IT governance model

A key element of any governance structure is promoting diverse membership with both IT and non-IT staff to facilitate IT/University mission alignment.

Governance Group	Scope	Proposed Membership*
Research Technology Committee	• Focuses on advanced information technology to support research University-wide, inclusive of research data. • Establishes priorities, identifies initiatives, and recommends funding of innovative technology projects that support the advanced information technology needs of research at the University.	• **Total: 6-8**
Academic Technology Committee	• Provides oversight of teaching and learning technologies at VT, inclusive of projects, policies, or standards related to VT classroom and lab technologies, the learning management system, and collaboration tools available to students and faculty. • Develops policies and standards related to the adoption and use of technologies University-wide that facilitate interoperability and standardization.	• **Total: 6-8** *Meeting participation may increase to include representative IT leadership depending on the topics discussed*
IT Risk Management Committee	• Align IT security practices with VT's tolerance for risk. • Establish accountability, authority, and responsibility for information protection. • Identify, prioritize, and develop IT security standards and enforcement mechanisms to be implemented across VT. • Communicate new IT security processes, practices, and standards across VT.	• **Total: 6-8**

**Note:* Representative model only; actual participants should be finalized and appointed by VT leadership

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1.2 Establish a University-wide IT governance model

Effective IT governance is determined as much by the supporting tools and processes as it is the membership and designated groups.

Charters

A charter template defines the key elements of each group including: responsibilities, membership, decision rights, inputs and outputs, and reporting requirements. This helps clarify each group's purpose.

Thresholds

To help bring the right decisions to the right group/level, a set of thresholds should be defined to differentiate between decision types on projects, policies, standards, and initiatives. Thresholds can be based on estimated hours to complete, risk, estimated cost, strategic impacts, etc. Once defined, the interaction model can use this information to determine who should have visibility into which types of decisions.

Committee Training

As part of the initial launch of a committee and as membership changes, members are trained on committee charter elements, supporting processes, and the overall governance model. This helps members understand committee operations within their specific group and how they fit into the larger governance model.

Defined Interaction Model

As part of the governance design, VT needs a model for governance interactions: how the individual groups interact with the business units represented, how the committees interact with one another, how and to whom decisions are escalated between IT governance groups, and how decision outcomes are communicated across the University.

Templates

A set of templates should support all activities. Templates should include: a project request form, a business case template, a project health check form, a technical standard template, a postmortem, or lessons learned template. VT should leverage existing templates where available.

Process Ownership

To be effective, committees need a person or group of people to support the actual operations. This includes activities such as developing materials for meetings, taking meeting minutes, tracking metrics, and moving decisions from one committee to another.

1.3 Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods

Provides clarity and structure over foundational IT disciplines while promoting use of operational and technical leading practices University-wide.

Problem Statement / Current State

- The Division of IT lacks a dedicated program management office placing pressure on managers to balance operational duties with program delivery.
- Effective project management within Division of IT is reported as inconsistent, with University-wide projects often initiated without stakeholder awareness or ongoing communication.
- Division of IT maintains project management standards on its website, but they are not uniformly adopted across Virginia Tech.
- VT lacks a defined IT enterprise architecture function.

Summary Description

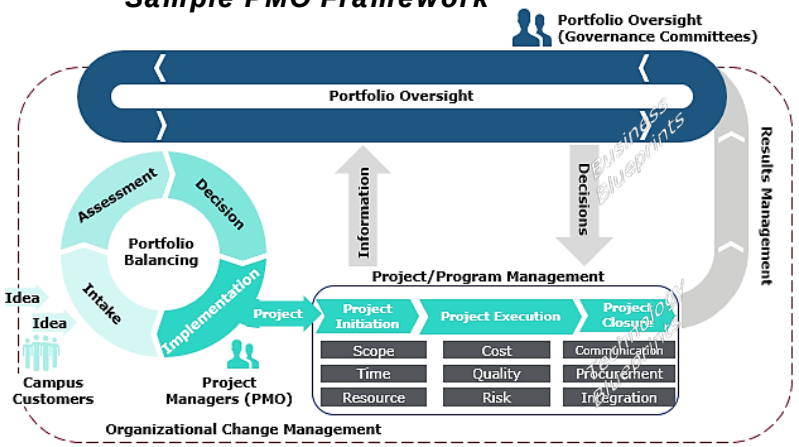
- Establish University-wide IT Project Management Office (PMO) and IT enterprise architecture functions within DoIT to provide clear oversight of VT-wide IT initiatives and facilitate development of IT enterprise architecture-based standards, frameworks, and principles that can be leveraged across the University.
- Build a technical architecture model that defines how IT assets enable mission execution.
- Develop standards and tools to govern and manage projects consistently.
- Define roles and responsibilities for the project management office and create a pool of project management resources.

Expected Benefits

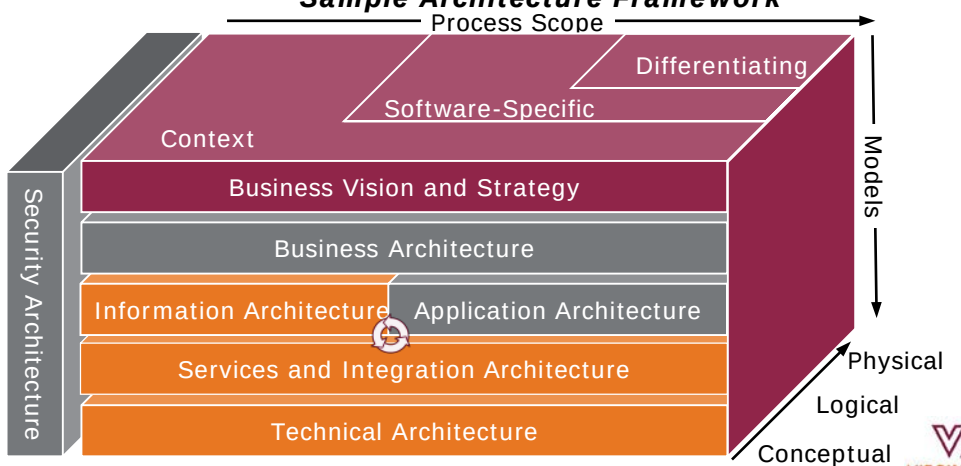
- Provides clarity over foundational IT disciplines that are either immature or not well understood across VT.
- Improves oversight to provide IT leadership with views into project health, issues, and risks.
- Pools project management resources in order to share best practice experiences as well as backfill for contingency.
- Standardizes methodologies and processes to provide more consistent results from program delivery.
- Provides opportunities to standardize applications, infrastructure, and application development practices in accordance with cybersecurity best practices.

Conceptual Model

Sample PMO Framework



Sample Architecture Framework



1.3 Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods

Implementing a University-wide IT Project Management Office and IT Enterprise Architecture framework will provide VT with more consistent results in projects delivered.

Implementation Activities

University-wide IT Project Management Office

IT Project and Portfolio Management Design:

- Design the structure and size of the EPMO
  - Evaluate the needs of the organization and associated budget/resources.
  - Determine the structure/size of the staff and RACI/reporting relationship.
- Set-up Standards and Processes
  - Create an EPMO framework document that includes the distinction between portfolios, programs and projects, and standards for project planning, issue tracking, risk management, resourcing and reporting.
- Operationalize the Organization
  - Assess and re-allocate distributed IT unit project managers where appropriate.
  - Train staff on project management standards and processes.
  - Assign projects based on thresholds determined to be appropriate.
- Project Management as a Service
  - Brand and communicate the service. Offer project management services to the distributed IT groups who need PM services.

IT Enterprise Architecture

Architecture and Design:

- Establish role of IT enterprise architecture team within DoIT and charter them to provide defined services and deliverables, with roles and responsibilities, guiding principles, and metrics.
- Establish cross-VT workgroups to develop framework, roadmaps, and standards, and recommend adoption of a centralized architecture framework.
- Analyze strategies and goals to understand technical capabilities.
- Define a set of principles, University-level requirements, and constraints.

Transition Planning:

- Divide the planned IT enterprise architecture activities into segments and prioritize work.
- Determine target maturity levels across segments.
- Develop and communicate the model to gain stakeholder buy-in.

Transition:

- Application project teams, plus college or distributed IT unit personnel during some migrations execute the model to incrementally define the target Technical Architecture and roadmap.
- Measure the progress, maturity, and effectiveness of the Technical Architecture program, and refine as necessary.

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1.3 Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods

Implementing Project Management Office and Enterprise Architecture framework will provide VT with more consistent results in projects delivered.

Success Metrics

- % of University-wide IT projects delivered on time, in scope, and on budget
- % reduction in number of application platforms

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | Medium | High

University-wide IT PMO:

- **Assessment and Determine PMO size:** 1 IT Strategy, Planning & Analysis FTE (1 month)
- **Set-up Standards and Processes:** 1 IT Strategy, Planning & Analysis FTE (1 month)
- **Operationalize the Organization**: 1 IT Strategy, Planning & Analysis FTE (3 months)
- **Project Management as a Service:** Ongoing service

IT Enterprise Architecture:

- **Architecture and Design:** IT Enterprise Architecture Lead, PM, 4-5 SMEs (3-6 months)
- **Transition Planning:** PMO, architecture domain managers (3 months)
- **Stakeholder Communication:** 1 FTE (2 months)
- **Transition:** Oversight and advisory support PMs, application project teams, plus unit IT personnel during some migrations (series of phases, 1-3 years total duration)

Risks / Dependencies

Low | Medium | High

- Transition of oversight over current University-wide IT projects will require significant communications and planning to limit disruption.
- Design and establishment of a new University-wide IT PMO and enterprise architecture function within DoIT should align with the rationalization of the IT organizational chart (see recommendation 3.1).
- VT can leverage the existing project management community of practice within DoIT to augment and support the establishment of standards, processes, and transitions of any current project management functions.
- At other institutions, IT enterprise architecture effectiveness has been difficult to assess as it is often viewed as an “intellectual” exercise; IT enterprise architecture implementation should therefore be tactical and applicable to key projects.
- Adoption and enforcement of IT enterprise architecture standards and policies enhanced by a comprehensive IT governance model (see recommendation 1.2).
- Strategic budgeting will be required to invest in elements of the technology roadmap and several migration projects.

Assumptions

- VT will be able to leverage key resources within the existing organization to stand up and staff the University-wide IT PMO and IT enterprise architecture functions.
- IT Governance will be aligned with the PMO.

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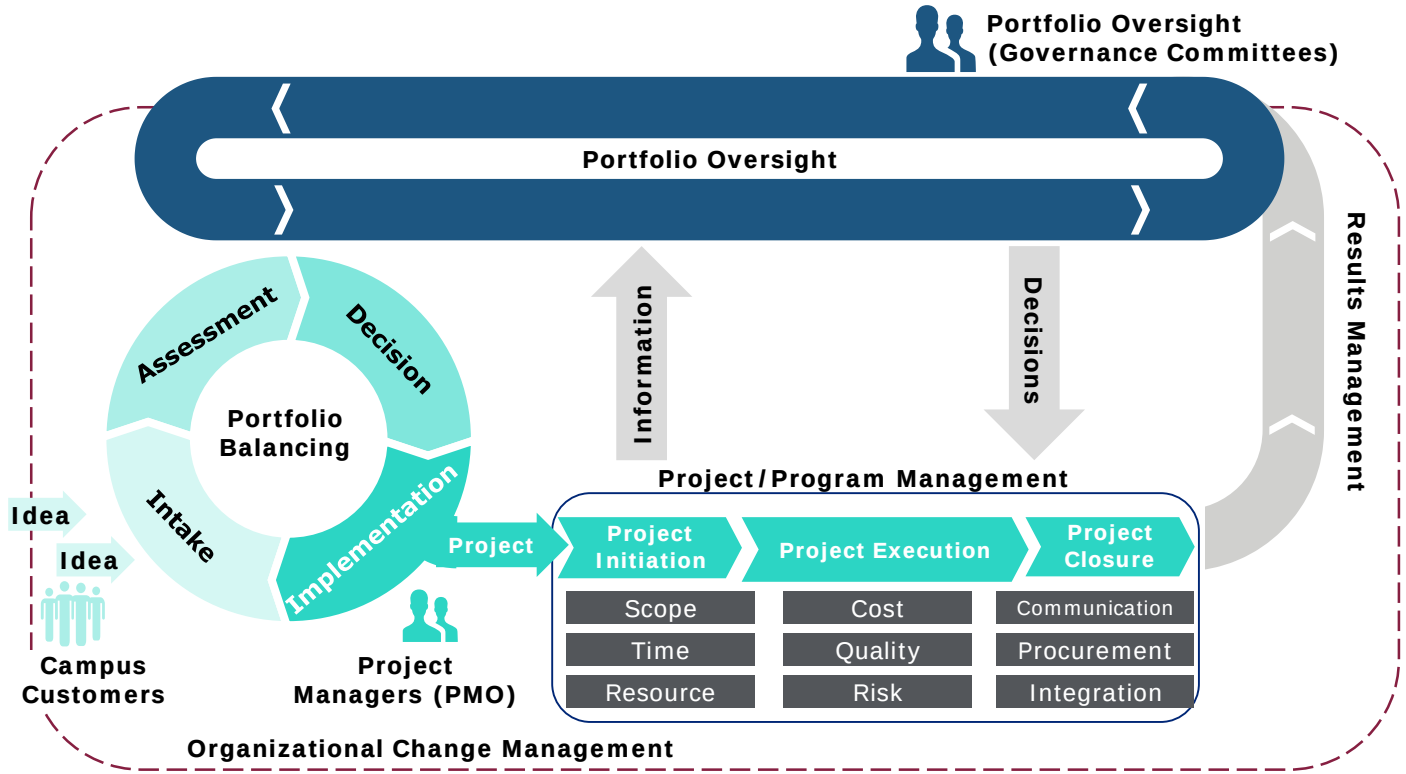
1.3 Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods

An PMO provides for clear oversight and accountability over University-wide IT-enabled projects based on leading practices from the higher education industry and in partnership with academic and administrative sponsors.



EPMO Considerations

- All University-wide projects <u>enabled by technology</u> should be part of a single IT portfolio that is managed consistently by the CIO to validate that outcomes are delivered within scope/schedule/budget, support adherence to architectural standards, and are ready for post go-live support.
- This EPMO will provide a single 'home' for the various IT-enabled projects being executed in partnership with academic and administrative sponsors.

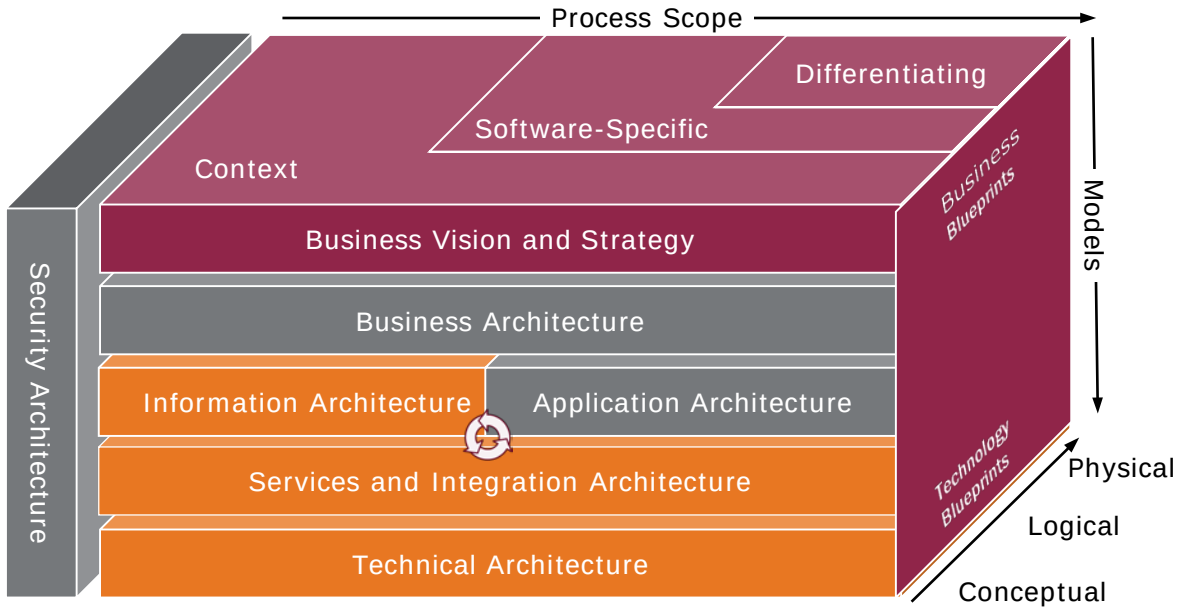
Portfolio Balancing	Project/Program Management	Results Management	Portfolio Oversight	Tools and Methods	Organizational Change Mgmt.
Receiving, evaluating, and deciding upon the execution of IT initiatives.	Managing and controlling project/ program progress, resources, risks, issues, financials, scope, and quality.	Managing, tracking, and reporting project results in comparison to a business case and baseline metrics.	Ongoing management of the overall portfolio. Constantly reassessing and improving processes.	Leading tools, templates, and methods that support VT-wide projects and can also be leveraged by local units.	Ongoing practices that facilitate increasing understanding, support, and adoption of new initiatives University-wide.

1.3 Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods

VT should consider establishing an architecture framework as the foundation to guide all modernization decisions going forward. A sample framework is provided below.

1. Leverage currently stable investments as an “integrated core platform” wherever possible.
2. Selectively accommodate “edge” applications with a focus on integration.
3. Use the IT enterprise architecture as a set of evolving standards for the business and IT planning, building, implementing, and supporting academic and administrative IT environments.
4. Design and adopt data content and transport standards for facilitating the exchange of information across business process boundaries.
5. Foster business process consistency supported by integrated platforms across units and colleges.
6. Focus on data integrity across applications and build it into any modernization process.

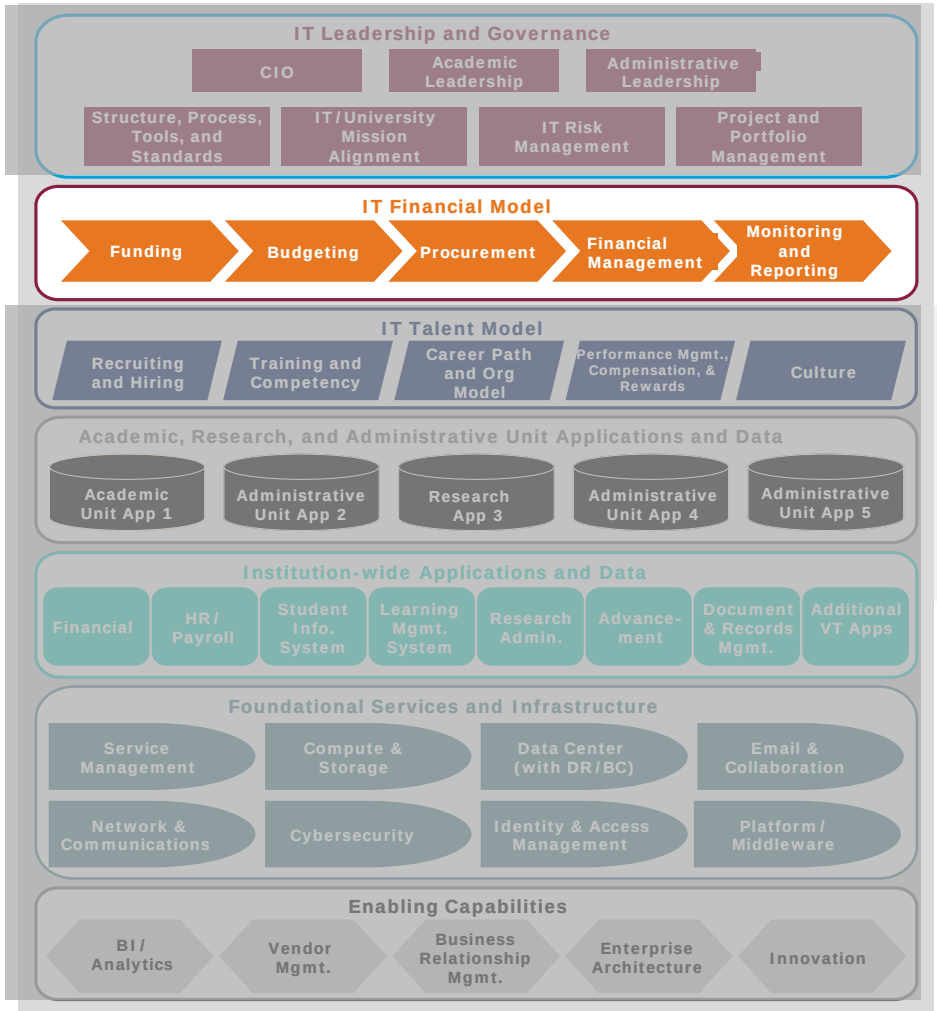
Sample Architecture Framework




IT Finance

IT Finance Recommendations

More collaborative financial processes for IT can drive visibility and coordination on IT initiatives and improve efficiencies and compliance.



2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery (e.g., network, collaboration tools, security and backup tools)

- Provides opportunities to reduce cost-recovery administration and increase standardization of solutions while creating a base-line set of services for all customers.

2.2 Streamline software procurement process to expedite acquisitions and improve the customer experience

- Creates a unified approach to IT procurement, aligning strategic prioritization, reducing sprawl and increasing operational efficiency.

2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

Centrally fund more IT services provided by DoIT, simplifying cost-recovery, promoting standardization, and encouraging greater use of DoIT services.

Problem Statement / Current State

- The fragmented state of funding across the University's IT units limits the ability to collaboratively fund common, University-wide services, leading to disparities in distributed level resourcing for IT support.
- Informal collaboration is achieved through various tools and forums such as the IT Council, but prevalence of formal channels to communicate shared IT needs that can be centrally funded or funded through pooled resources varies greatly across distributed IT units and colleges.
- Units reported they commonly had to pay for services out of their own budgets that were otherwise ubiquitous throughout the University and could be supported at the University level.
- Instances of sprawl and duplicative systems are prevalent including collaboration, financial management, service management, learning management and data visualization tools.

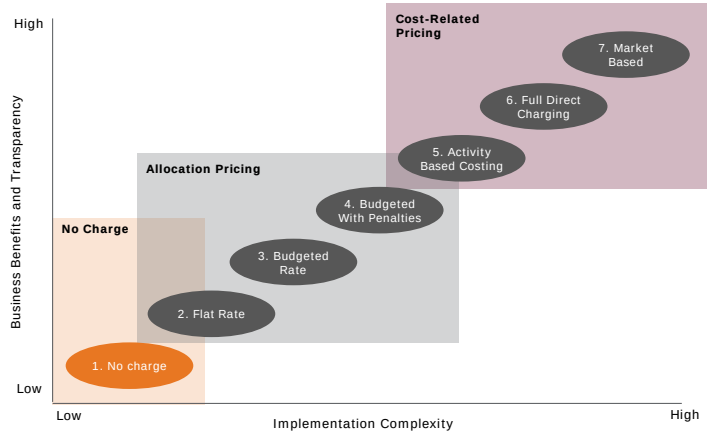
Summary Description

- Create a unified approach to funding IT at VT that is more transparent and collaborative than today's approach.
- Craft a set of foundational principles for the IT funding model that fosters alignment of IT to strategic priorities.
- Redefine the mechanisms that will fund IT services, including a flat rate for commodity services and recharge for "premium" services.
- Communicate changes to the IT funding model to each of the distributed IT units and increase consistency of formal channels for communicating shared IT needs across distributed IT units.

Expected Benefits

- Offers opportunity to shift funding from units to DoIT to provide common services without a direct charge or as part of a simplified rate paid by each distributed unit, incentivizing units to leverage DoIT services and reduce administrative overhead.
- Provides opportunities to reduce cost-recovery administration and increase standardization of solutions while creating a base-line set of services for all customers.
- Supports any re-organization of IT services from distributed IT units to DoIT.
- Enables a common and transparent methodology by which to charge for auxiliary services.

Conceptual Model



2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

Centrally fund more IT services provided by DoIT, simplifying cost-recovery, promoting standardization, and encouraging greater use of DoIT services.

Implementation Activities

- Establish a working group of IT finance directors and members of VP of Finance's office to oversee development, implementation, and refinement of the IT funding model and establish regular communication with new IT governance groups, inclusive of representation from DoIT and distributed IT.
- Define and establish services needed University-wide, and the funding required to support provision and growth of those services.
- Identify and catalog services and solutions that might be considered "commodities." (consider network, collaboration tools, security and backup tools based on stakeholder interview)
- Develop a prototype funding for initial set of commodity services that accounts for total costs and clearly designate which funding sources will cover various IT expense categories.
- Document the prototype funding model for future reference and continued development and customization.
- Enhance service catalog to define which services would be auxiliaries and encompasses a methodology for determining corresponding rates.
- Define an implementation, communication, and training plan.

Success Metrics

- % decrease of DoIT funding from recharge
- % distributed unit and college operating budget spend on DoIT-provided services

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | Medium | High

- **Create Foundational Principles:** 1-2 FTEs (1 month)
- **Develop Prototype Funding Model:** 1-2 FTEs (3-6 months)
- **Redesign IT Funding Model:** 2-3 FTEs for 8-10 months implementing new funding model processes, developing new methodology for auxiliary commodity or "premium" services, and documenting and changes to all stakeholders.
- **Deploy change management plan:** 1 FTE for 3-4 months to design communication and training plans and deliver trainings and workshops

Risks / Dependencies

Low | Medium | High

- DoIT is currently exploring options to simplify the cost-recovery model for network services – this effort can yield lessons learned on how other common service might be funded
- Requires an enhanced IT governance structure (see recommendation 1.2) and defined IT operating model (see recommendation 1.1) to provide unified oversight of IT and lead initiatives and account for what will be provisioned centrally.
- In allocation-based funding models, it is necessary to intentionally build in funds for strategic initiatives.
- This effort can build off the existing work that DoIT's NI&S has been conducting with VP Finance to improve the auxiliary model for network services.

Assumptions

- IT directors at colleges and units will disclose IT budgets, activities, and initiatives to enable transparency on common needs and IT budget and funding data is relatively consistent.
- There are no major restrictions for changing budget models, premium services, or funding sources.
- It will be important that, in cases where the VT IT funding model may shift funding from the distributed units to the center, such costs are understood, and, where practical, the University shifts funding (between DoIT and colleges/ units) in alignment with costs. Further, it is important that the ultimate funding model encourages good stewardship of VT resources, with a focus on risk mitigation and efficiency.

2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

Centrally fund more IT services provided by DoIT, simplifying cost-recovery, promoting standardization, and encouraging greater use of DoIT services.

VT IT Funding Model Foundational Principles

Transparent – The funding model should be easy to understand and should allow stakeholders to more clearly visualize how IT is financed across VT.

Promotes Accountability – With additional transparency comes the ability to understand how IT expenses are funded through various sources and how leadership can proactively manage funding sources to plan for future IT operations.

Collaborative – The funding model should allow stakeholders from DoIT, VP of Finance's office, and distributed IT units to collaborate and prioritize funding for shared needs.

Flexible – VT's funding model needs to be flexible and adaptable to meet the rapidly changing financial landscape of higher education, technology, and state policy.

Enhances Financial Planning – As VT looks to adopt best-in-class technology, the funding model needs to provide opportunities for investments and reliable data to facilitate forecasting and financial planning.

2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

Centrally fund more IT services provided by DoIT, simplifying cost-recovery, promoting standardization, and encouraging greater use of DoIT services.

Commodity Services

- Commodity Services are IT services that can be provided University-wide without the need for major customization or special requirements; they may or may not be auxiliaries contingent on whether a cost-recovery model is leveraged to fund them.
- Any service that supports and serves the “common good” regarding IT can be considered a Commodity Service.

Examples:

- Email
- Network
- Telecommunication Services
- Data Center Services
- Backup and Recovery

“Premium” Services

- Premium Services are auxiliary IT services that go beyond the scope of Commodity Services and can be provided as an additional service to the University, often requiring a degree of customization or service requirement from customers.
- Any service that can be direct billed or charged to a college or unit from a central IT group can be considered an Auxiliary Service.

Examples:

- Application Development and Support
- Complex Integration Services
- IT Training
- Supplemental Labor and Support Services

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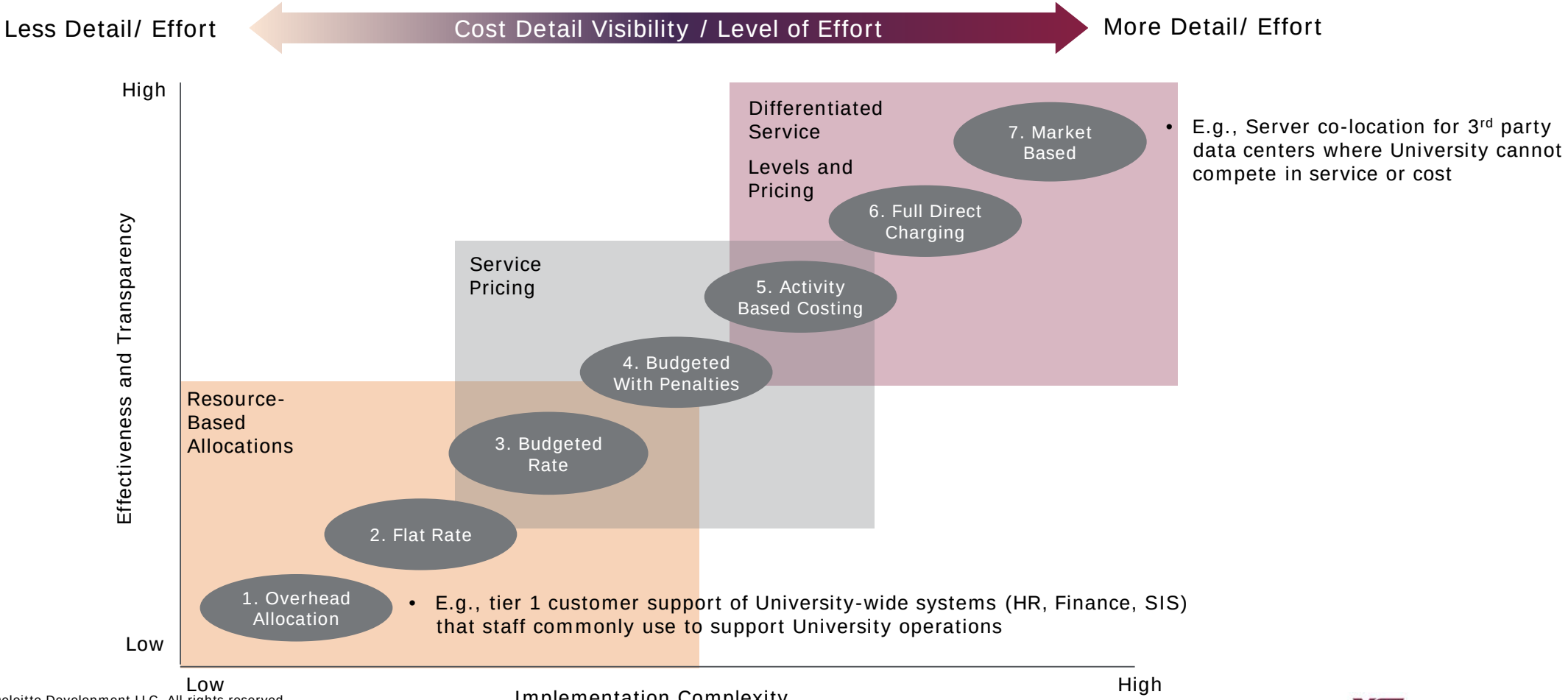
2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

The chart below illustrates several chargeback strategies, each of which exhibits a tradeoff between transparency and complexity. VT should consider which strategy is most appropriate depending on the type of commodity or auxiliary service. Generally, commodity services are best provisioned without charge or at a flat or budgeted rate where as “premium” services necessitate more cost-related services.



2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

The table below illustrates common IT services provided by a central IT group within higher education. Services can be considered a commodity or auxiliary, depending on the level of customization.

IT Service Category	*Examples*	*Potential Need for Service Customization*
Access Management	Authentication, password management, and identity services.	
Advancement IT Support	IT equipment or applications that have been requested by University Advancement.	
ERP Application Support	Maintenance and support for PeopleSoft HCM and PeopleSoft Finance.	
Capital Equipment	University-wide IT hardware and equipment maintained by DoIT.	
Customer Relationship Management (CRM)	Support and development expenses for CRM applications.	
Data Center	Services to support the physical and technical environment of the data center.	
Data Warehouse	Support of the data repository and any analytic or reporting applications.	
Endpoint Management	Operating system and security updates for desktops and mobile devices.	
IT Hardware	Desktops, laptops, tablets, and any other IT peripheral equipment.	
Help Desk	Customer support services for any IT hardware or software troubleshooting.	
Learning Space Technology	IT applications or equipment specific to classroom learning environments.	
Media Services	Photography, video production, and social media support services.	
Network	Internet routers and networking equipment, including network support services.	
Printing	Printing/MFD devices and specialized printing services.	

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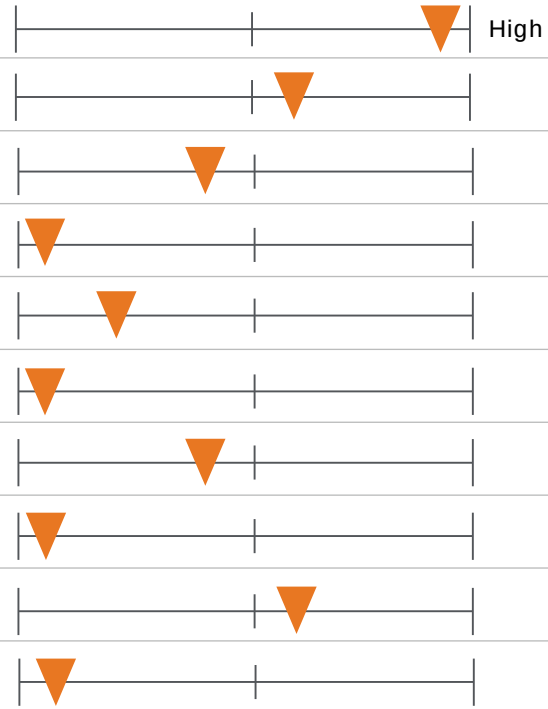
2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery

The table below illustrates common IT services provided by a central IT group within higher education. Services can be considered a commodity or auxiliary, depending on the level of customization.

IT Service Category	*Examples*	*Potential Need for Service Customization*
Project Support	Implementation and change management support for major IT projects and initiatives.	Low — High
Research Computing*	Base-level storage, computing capabilities and infrastructure supporting common research needs.	
Security	Information risk management, security program development, and incident management.	
Servers	Physical and virtual server expenses.	
Site Licensing	Website publishing and hosting, application install issues, recent order inquiries, and license changes	
Storage	Equipment and support for shared drives, cloud storage, and file sharing.	
System Integrations	Application integration support for IT applications that require connection to larger infrastructure.	
Telephone/Telecom Services	Telephone service, long distance telephone support, and voice mail.	
Training	Resources and development of IT training, including VPN, Office 365, Google, Slack, and Canvas training.	
Electronic Signature Software	Support for campus-wide ESS Solution	



* VT may consider expanding the standard package for research computing to all VT faculty that includes a baseline level of additional computing capability to achieve VT's research goals and incentivize use of additional research computing services.

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2.2 Streamline software procurement process to expedite acquisitions and improve the customer experience

Enhance IT procurement by implementing a systematic and customer-oriented approach that maintains risk reviews while improving and expediting the software procurement experience.

Problem Statement / Current State

- The centrally managed process for software procurement is reported as slow (3-6 months and sometimes a year), bureaucratic, and not transparent; while it is designed to limit risk, the process as-is creates risk from non-compliance, unsecured development of custom applications, and impacts to faculty research and the faculty/staff/student experience from not having the tools they need in time to use them.
- The portal by which to submit a request is described as non-user friendly, requiring information in terms that a faculty member or staff member may not understand.
- Some of the backlog was attributed to having only 1 staff member in Legal assigned to reviewing software contracts on a “first-in, first-out” basis and an extensive review process to limit risk.

Summary Description

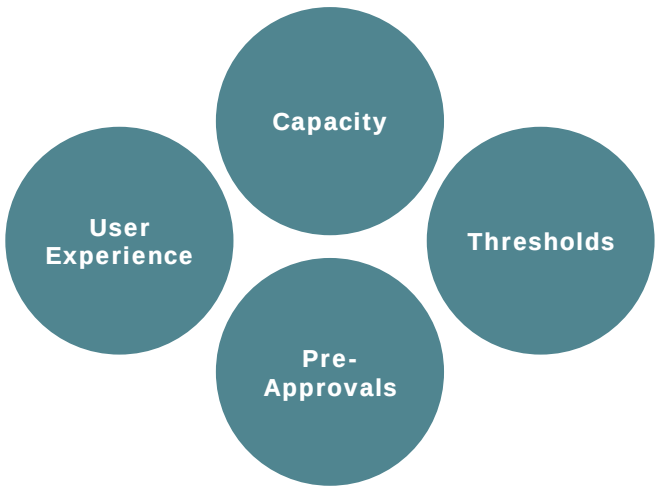
- Analyze procurement requests and process to identify gaps and areas of uncertainty in the request process.
- Initiate end user training sessions and communications.
- Streamline the procurement workflow process to efficiently approve requests and reduce backlog.

Expected Benefits

- Reduced backlog for IT procurement requests, allowing projects to stay on time and on budget while reducing the risk of spending sprawl.
- Ability to balance and prioritize both legal and security review while providing an improved customer experience to all IT customers.
- Enhanced user experience in submitting software procurement requests.

Conceptual Model

Process Considerations:



2.2 Streamline software procurement process to expedite acquisitions and improve the customer experience

Enhance IT procurement by implementing a systematic and customer-oriented approach that maintains risk reviews while improving and expediting the software procurement experience.

Implementation Activities

- Elevate the role of the current working group within Enterprise Administrative Operations to steward and champion findings and recommendations (adopt charter and expand membership to all impacted parties as necessary).
- Map end-to-end procurement process and document time-in-review by each group (e.g., procurement, legal, security, IT PALS).
- Analyze software procurement submitted for approval by amount, type, vendor, and data collected if purchased previously to identify trends and inform on potential thresholds.
- Evaluate practices leveraged by other Virginia institutions and determine applicability of adopting similar protocols and standards for review and approval.
- Consider mechanisms by which to enhance process in the near and long-term including increasing capacity, implementing thresholds, expanding and communicating pre-approved software vs. procuring new software, and enhancing the user experience.
- Communicate findings and recommendations to impacted stakeholders and customers.
- Develop communications and trainings to smooth transition to new purchasing process before phasing in adopted recommendations.

Success Metrics

- # of outstanding procurement requests in IT PALS/ legal / security review
- Reduction in average time to complete procurement review

Implementation Timeline

0 – 9 months | **10 – 18 months** | 19 – 36 months

Level of Effort

Low | **Medium** | High

- **Conduct Workgroup study:** Working group of FTEs (3 months)
- **Develop and Socialize Recommendations: 1-2 FTEs** (2-3 months)
- **Develop Communications and Trainings for new procurement process:** 1-2 FTEs (1 month)
- **Phase in Recommendations:** 1-2 FTEs (2-3 months)

Risks / Dependencies

Low | **Medium** | High

- Involves strong IT governance (see recommendation 1.2), coordination across procurement and legal, and utilizing a working group to develop and drive IT software procurement process strategy and standards.

Assumptions

- VT procurement, DoIT, and legal will be given appropriate controls to enforce process and new approval workflow.
- End user training and change management will be provided to communicate changes and enhancements

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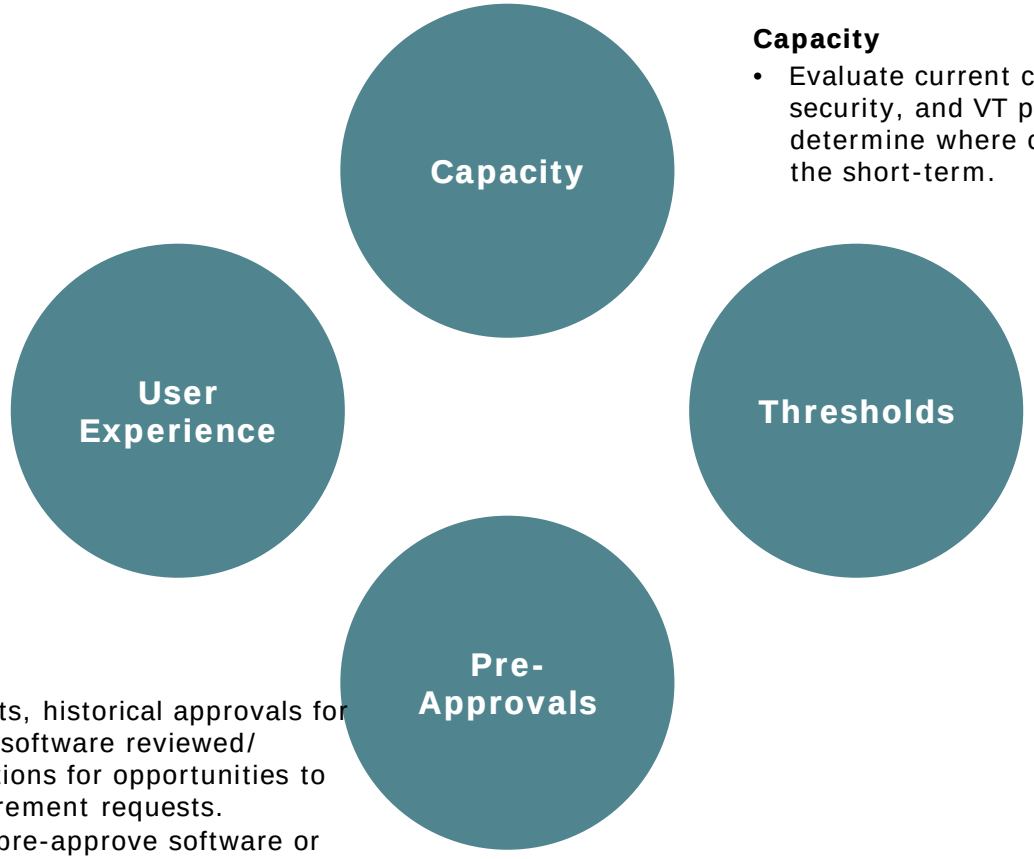
2.2 Streamline software procurement process to expedite acquisitions and improve the customer experience

Based on the findings during the current state, VT can consider several options by which to improve the current process in the near and long-term.



Capacity

- Evaluate current capacity of resource in IT PALS, legal, security, and VT procurement against volume of requests to determine where capacity can be added to remedy backlog in the short-term.

User Experience:

- Assess intake form for submitting requests from a user perspective to determine potential improvements in usability.
- Identify opportunities to improve ticket tracking so users where their procurement request is in the review process.
- Proactively communicate what software has been pre-approved to customers so they are more aware of what can be expedited for procurement.

Thresholds:

- Assess application of thresholds based on value and data collected to determine what level of review is required.

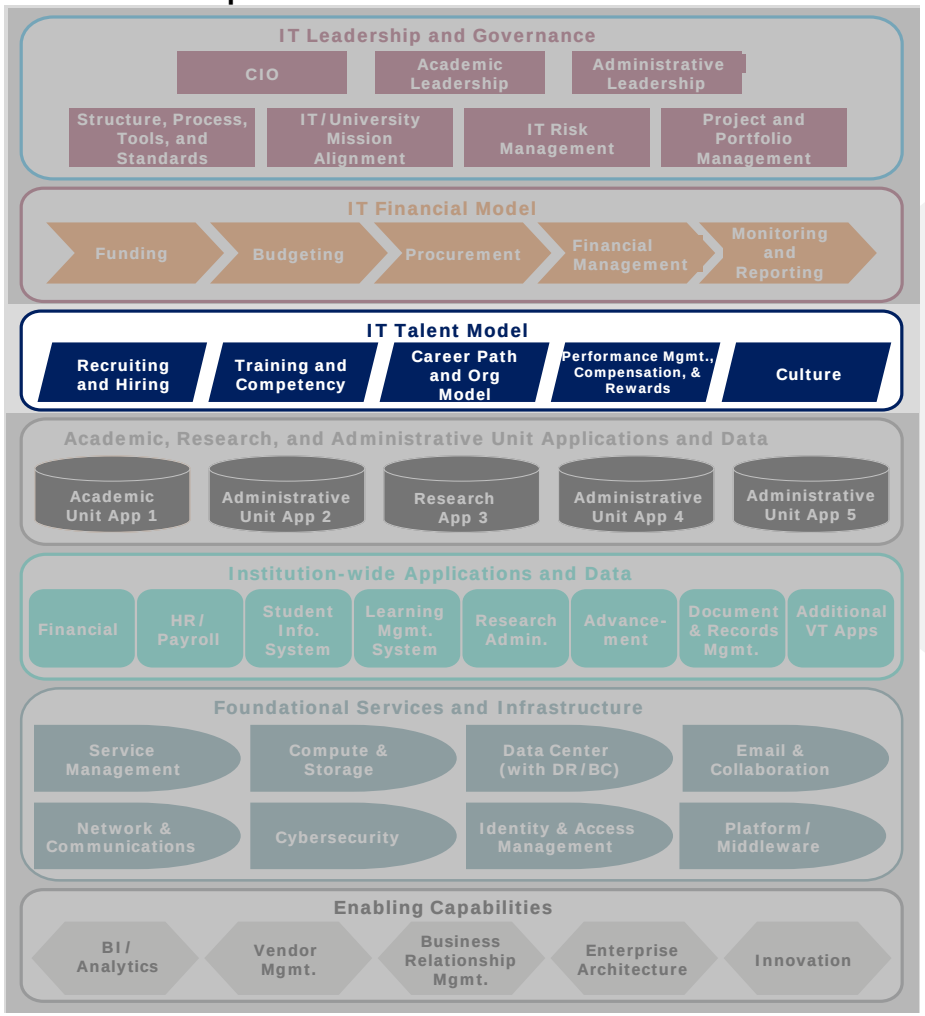
Pre-approvals:

- Analyze current University-wide agreements, historical approvals for similar solutions by the same vendor, and software reviewed/ approved by fellow Commonwealth institutions for opportunities to pre-approve or expedite reviews for procurement requests.
- Explore other forums or tools by which to pre-approve software or streamline review process (e.g., EDUCAUSE's Higher Education Community Vendor Assessment Toolkit).
- Conduct periodic evaluations to determine opportunities to implement University-wide agreements for select solutions commonly requested.


IT Talent

IT Talent Recommendations

A revised organizational model along with a system for classifying job roles will strengthen Virginia Tech IT leadership and staff's ability to plan, collaborate, and support employee development for enhancing DoIT's service capabilities.



3.1 Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities (e.g., PMO, OCM, BRM)

- Improves understanding of IT org role arrangement, communications, and responsibilities throughout DoIT.
- Enables more effective and efficient coordination and use of resources by consolidating duplicative activities and providing outlets for functional gaps within DoIT and distributed IT.

3.2 Standardize job classifications for IT staff across VT to improve career pathing, training, performance management, and compensation management

- Empowers employees to understand their roles and responsibilities more clearly, giving them mechanisms to develop their careers and improve their skill sets.
- Serves as a foundation for improved accountability, governance, communication, and collaboration of roles and functions.

3.1 Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities

Modifying DoIT's organizational model facilitates better talent management, increases collaboration, and enables more consistent engagement and service for the broader University.

Problem Statement / Current State

- Stakeholders across VT commonly voiced a lack of clarity on the organizational structure for the Division of IT, inclusive of not having clear reporting relationships and roles and responsibilities.
- Division of IT has a reportedly flat leadership structure, with the CIO having 13 direct reports.
- Resource management inefficiencies and duplication of efforts identified to be due to functional gaps such as no Project Management Office (PMO) and enterprise architecture function along with limited Business Relationship Management (BRM) and application development that is fragmented throughout distributed units.

Summary Description

- Design a future state organization that can deliver quality and comprehensive services with greater efficiency and consistency.
- Analyze staffing counts by function across Division of IT and broader distributed IT units to assess IT roles relative to functional needs.
- Outline a plan for organizational change roll-out.
- Implement the future state organizational model.

Expected Benefits

- Greater efficiency and consistency in the customer experience from reduced fragmentation in services and disparity in support resources.
- Improved understanding of the IT organization and operating model across VT.
- Manage resources more effectively and proactively to address demand and prioritization.
- Foster increased collaboration of talent across IT through refined functional alignment.

3.1 Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities

Modifying DoIT's organizational model facilitates better talent management, increases collaboration, and enables more consistent engagement and service for the broader University.

Implementation Activities

- Conduct a staff activity analysis and staff skills assessment to understand the full scope of IT activities and current staff capabilities and identify where activities can be optimized, such as areas of overlap across IT service providers (e.g. IT & Desktop Support, cyber-security support) or areas with gaps in oversight (program management).
- Define a set of guiding criteria to help map the scope of roles and responsibilities across DoIT and distributed units; existing initiative to improve operations of the office of the CIO utilizing an Executive Program license with Gartner may help develop the guiding criteria.
- Incorporate input from administrative, academic, and research leaders at the executive, college, and unit levels on identified needs and expectations.
- Design a new IT organizational model that supports VT's strategic IT priorities; design a near-term organizational model and a future state organizational model with a phased approach to achieving rationalization of IT services and resources.
- Develop flexible deployment models to shift resources according to priorities.
- Work with Office of HR to determine the pace at which VT can rollout organizational changes (i.e., on a scale from big bang to slow phased approach).
- Implement new IT organizational model and communicate relevant changes to impacted customers.

Success Metrics

- Reduction in number of duplicative services across the University.
- % of staff transitioned into the new organization.

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | **Medium** | High

- **Organizational Model Design**: 2 FTEs for 3 months.
- **Organizational Model Implementation**: 3 FTEs (20-24 months).
- **Change management** is assumed to be at the overall program level and should support this specific project heavily.

Risks / Dependencies

Low | **Medium** | High

- Possible change in scope of responsibility for various IT leaders across VT will require significant change management.
- Virginia Tech leadership at the executive, Division of IT, and broader distributed unit levels need to be highly supportive of the change.
- Engagement with all colleges and units from the start will be essential to being able to execute the strategy designed.
- Alignment with goals of a defined IT operating model (see recommendation 1.1) will be required to bolster implementation activities of establishing scope of authority between Division of IT and distributed IT.

Assumptions

- Staff can effectively collaborate and partner on responsibilities and projects across IT org units as part of an enhanced deployment strategy.

3.1 Revise the organizational structure within DoIT

As Virginia Tech works to standardize their IT organizational framework, the following key questions should be taken into consideration.

Customers
What customers does the IT organization provide services to?

Funding
How will IT be funded? Is this consistent across all services and customers?

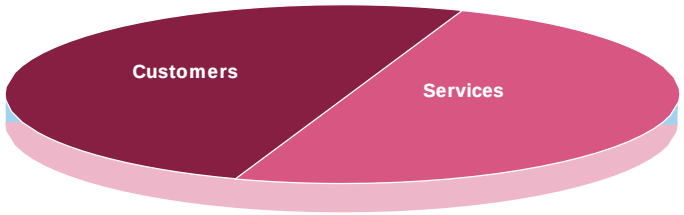
Channels
What channels do customers interact with to obtain the defined services?

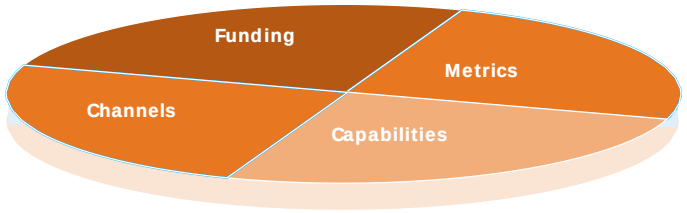
Interactions
How do the capabilities interact to deliver the services?

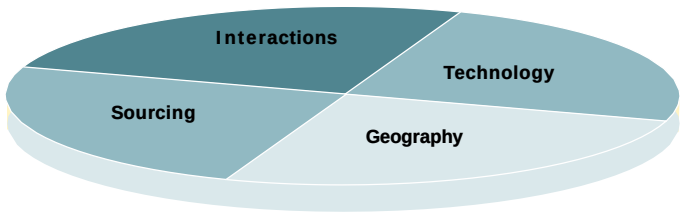
Sourcing
How will capabilities be provided: in house, vendor, or hybrid?

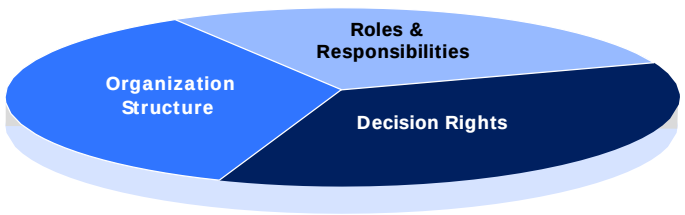
Organization Structure
What does the IT organization structure look like? What should the span of control be?

Decision Rights
What authorities/authorizations are distributed throughout the organization?









Services
What macro-level services does DoIT provide to the organization as a whole, and what does it not provide?

Metrics
What metrics need to be measured and reported on to manage how the Central IT organization delivers services?

Capabilities
What capabilities does IT need to have in order to provide its services?

Technology
What underlying technologies are required to deliver the capabilities/services?

Geography
What services are provided in which locations?

Roles and Responsibilities
What are the specific roles and responsibilities of the organization elements/units in executing the operating model?

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3.1 Revise the organizational structure within DoIT

These techniques were used to improve span of control within Division of IT, enabling better oversight and maximizing employee skill-sets and functions.

Adjust Span of Control to Meet Best Practices	Modifying span of control to between 6-10 direct reports for senior leadership enables leaders to effectively manage oversight while also performing other responsibilities such as catalyst and strategist-type tasks. [1]
Eliminate 1:1 and most 1:2 Reporting Relationships	Eliminating 1:1 reporting relationships allows for concentration of management responsibilities and increased level of focus of individual contributors.
Align Expertise	Shifting support functions (e.g. Help Desk, HR) to align with expertise center, creating better support mechanisms for Virginia Tech faculty, staff and students.
Increase Staff Leverage	Reporting relationships should reflect staff grade levels, as senior staff have significant experience and management expertise (e.g. minimum of 7 direct reports per VP, minimum of 5 reports to a director, VP to VP reporting on an exception basis only, etc.).
Increase Consistency Across Similar Groups	Arranging groups with similar responsibilities, (e.g. FP&A) to be structured and staffed in a consistent manner allows for increased efficiency, more effective deployment of staff and potential headcount reductions.
Combine Small Groups with Similar Responsibilities	Standardizing small groups with similar responsibilities and skill sets or supporting specific customers (e.g. Information Security Operations, Identity & Access Management) together allows for better sharing of management and support resources and could potentially lead to headcount reductions.

[1] Roles of a CIO and leadership

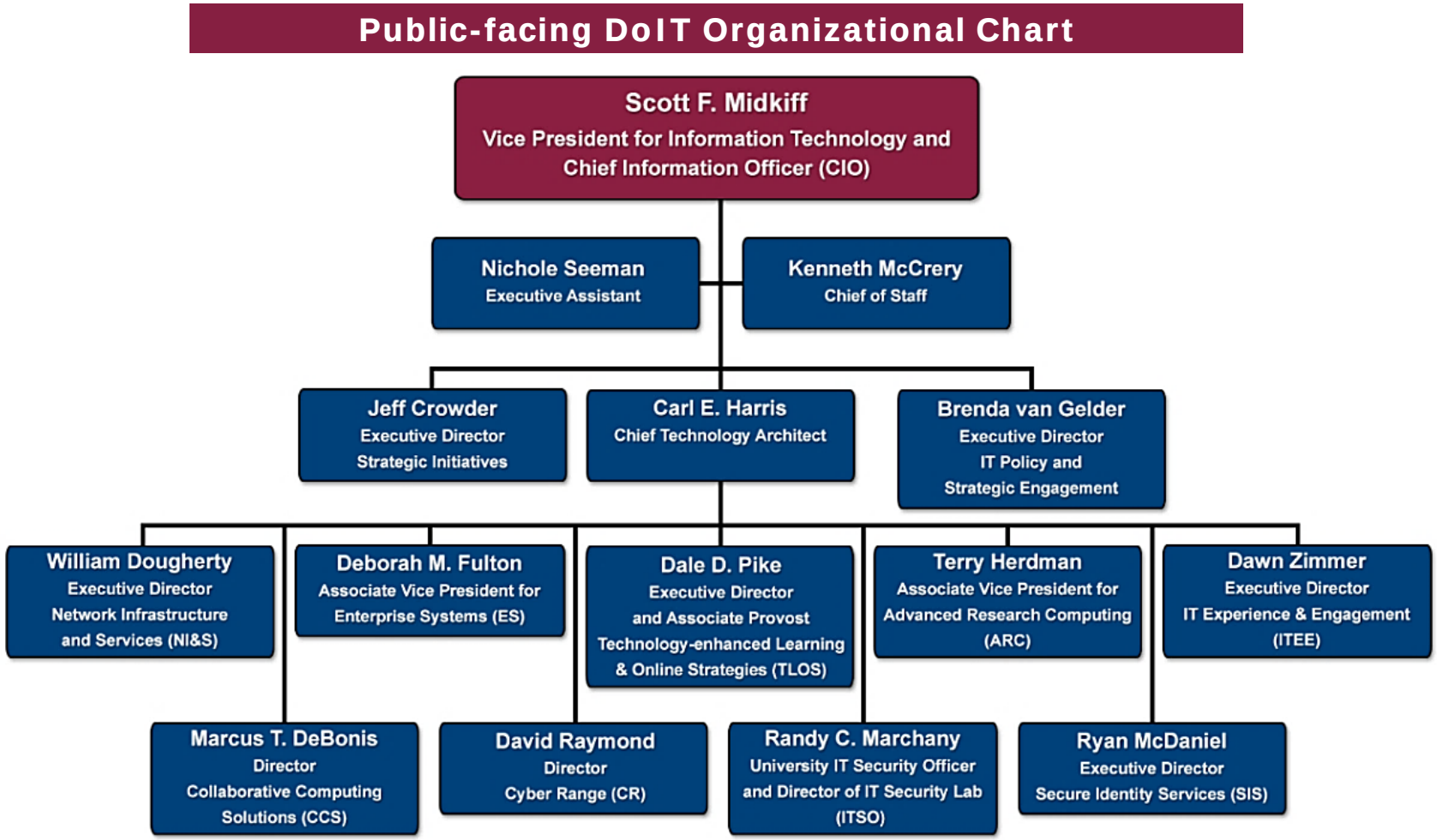
3.1 Revise the organizational structure within DoIT

An organization's span of control that is too wide or too narrow can cause organizational inefficiencies. One of the goals for revising the Organizational Structure includes developing span of control that empowers IT Leadership to become more proactive, agile, and innovative.

	Wide	Optimal	Narrow
When to Use	A wider span of control is typically used for transactional processes / activities where the work performed by HR staff is very similar.	An optimal span of control can be applied to typical organization structures.	A narrow span of control can be applied for specialized & complex functions or in circumstances where the employees carry out specialized and complex activities that require consistent coordination and direction.
Example	1 Manager has 20 Reports (1:20)	1 Manager has 8 reports (1:8)	1 Manager has 3 Reports (1:3)
Characteristics	▪ Upper management not connected to issues on ground level ▪ Increased stress at manager-level due to excessive workload ▪ Large number of "improvement projects" at middle management layers that may be of low value add and not implemented ▪ Reduced opportunities for continuous one-on-one performance feedback ▪ Greater need for "assistants" or "chiefs of staff"	▪ Upper management connected to work happening on the ground ▪ Middle managers spending most of their time managing and some of their time improving operations ▪ Highly impactful "improvement projects", most of which are implemented ▪ Workers aligned with Executive priorities	▪ Middle managers spending close to 100% of time managing others (micromanaging), or a significant amount of time performing work (working supervisors) ▪ Upper managers focused on tactical aspects of the business due to time constraints ▪ Not enough focus spent on long-term priorities ▪ Too few "improvement projects" undertaken in the organization resulting in process inefficiencies ▪ High overhead cost

3.1 Revise the organizational structure within DoIT

The following is a graphical representation of Division of IT's current public Organizational Chart, which can be a reference model for comparing against the revised organizational structure shown in subsequent slides.



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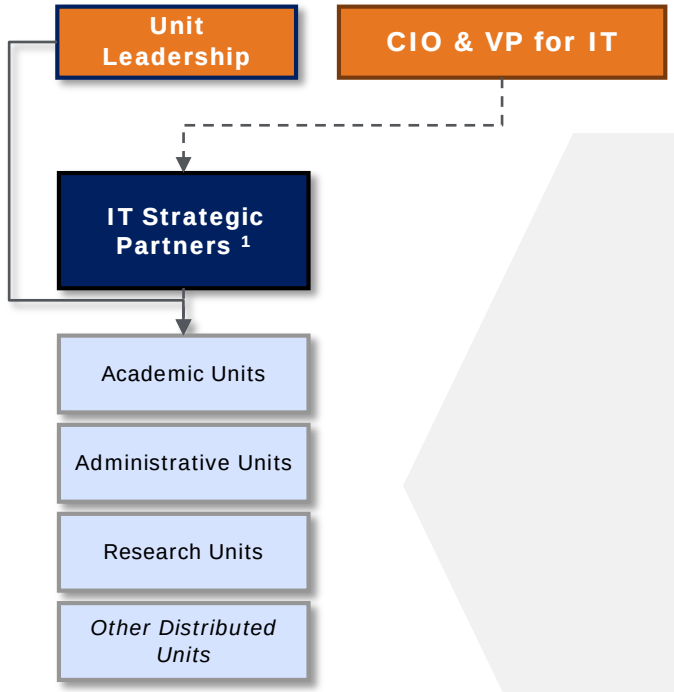
3.1 Revise the organizational structure within DoIT

In the revised organization structure, the IT Council's role can be broadened over time to serve in the IT Strategic Partners' capacity to streamline engagement and collaboration between DoIT and distributed IT units.



IT Strategic Partners' representation can be expanded to empower and enable all distributed units to contribute.

The IT Strategic Partners group would act in an advisory role for DoIT while being accountable to both IT and their Unit Leadership

IT Strategic Partner Principles

1. **Transparent Relationships –** Roles, responsibilities, and accountabilities are well defined and communicated to relevant stakeholders.
2. **Simplified Communications –** Business and IT requirements are communicated centrally through designated individuals.
3. **Trusted Partnerships –** Relationships between DoIT and the distributed units are built on mutual trust and respect.
4. **Collaboration–** Units and I&P engage through established channels to drive development of shared technology solutions.

Core Enabling Competencies 1

1. **Innovation, Strategy, and Planning–** Provide strategic requirements and use cases to foster innovation and efficiency of IT services.
2. **Communications –** Serve as point of contact between DoIT and distributed units to enhance collaboration.
3. **Operations –** Advocate for how DoIT can support each distributed unit's needs and services.
4. **Continuous Improvement –** facilitate change and evaluate areas for improvement to exceed customer satisfaction goals.

3.1 Revise the organizational structure within DoIT

Upon establishment of the new organizational structure and demonstrable maturation of DoIT's core capabilities as a trusted IT service provider, VT leadership should pilot centralization/ reporting of distributed IT groups into the new DoIT organizational structure before rolling out a more aggressive centralization program University-wide.

1. Identify Commodity Services To Be Centralized*

- Analyze which services are specialized vs. commodities which may include:
  - IT & Desktop Support
  - Data Center Services
  - Application Support for University-wide applications

2. Organizational Structure Pilot Development

- Select one or two units to begin transitioning services
- Assess how and which staff should be transitioned between DoIT and distributed units.

3. Develop Process to Measure Success of Migration

- Identify Key Performance Metrics and Reporting.
- Create opportunities for receiving feedback.

4. Deploy Implementation Plan

- Identify resource requirements.
- Deploy transition plan at University-level, leveraging change management concepts throughout.

5. Refine Implementation Plan

- Develop, test, and refine plan based on feedback from PoC/pilot.
- Build Center of Excellence to govern capability.

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3.2 Standardize job classifications for IT staff across VT to improve training, career development, and performance management

Systemizing job titles across DoIT and distributed IT units increases role clarity, accountability while improving the ability to assess and develop skillsets needed to sustain VT's goals for innovation and advancement.

Problem Statement / Current State

- VT's IT workforce has 44 unique position classifications with over 400 job titles.
- Anecdotally, it has been voiced that there is job misalignment such as data scientists filling general reporting needs.
- Lack of University-wide job architecture creates disparities in role expectations and causes difficulties with assessing performance and defining career pathways.

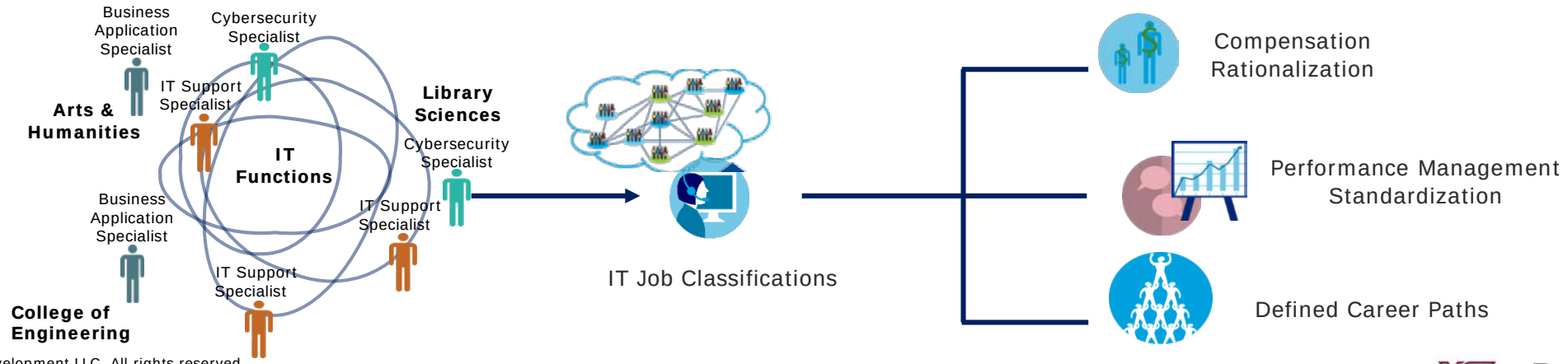
Summary Description

- Conduct a detailed skills, scope, and functional alignment assessment of existing IT talent in DoIT and all distributed IT units to support revised organizational structure.
- Aligns job titles to their actual work function and develops a standard for IT job titles across VT.
- Communicate impact of changes to community and cultivate buy-in from those affected by new role classifications.

Expected Benefits

- Enables ability to develop consistent skills and knowledge base, supporting modern career paths for staff.
- Gives direction for managers to improve annual reviews and performance management feedback.
- Reinforces existing Division of HR hiring and compensation policies and provides framework for building clearly defined rationalization of compensation changes, paths for promotion, and internal mobility.
- Reduces/eliminates unplanned cross-institution talent migration.

Conceptual Model



DRAFT – For discussion purposes only

3.2 Standardize job classifications for IT staff across VT to improve training, career development, and performance management

Systemizing job titles across DoIT and distributed IT units increases role clarity, accountability while improving the ability to assess and develop skillsets needed to sustain VT's goals for innovation and advancement.

Implementation Activities

- Analyze similarities in IT job roles across DoIT and distributed units and formulate consistent IT job titles.
- Cross-map and standardize IT job titles to facilitate efficient knowledge-sharing for comparable IT job functions.
- Analyze and evaluate skills inventory and scope of responsibility across all job functions to promote job alignment and identify gaps needed to fulfill the future state vision.
- Map job functions and titles of current staff to re-designed model and develop transition approach.
- Define career paths in agreement with the Commonwealth of Virginia's Classification structure or VT Staff Classifications where applicable. Where needed, Division of IT and distributed IT units will need to work in tandem with both central and DoIT HR to validate that new titling and pay structure are able to adequately reflect the complexity and impact of the roles within their units.
- Develop linkages between functions, expectations, training requirements and development opportunities, using VT's existing Office of HR career framework initiative to support this activity.
- Create Employee Transition Plan that include strategy for supporting knowledge gap transitions for staff moving into new roles and training and development to address identified functional gaps in IT talent workforce.

Success Metrics

- # of unique IT job titles at VT
- # of staffing ratios by function in alignment with industry benchmarks
- % of staffing job compensation within aligned market thresholds*

Implementation Timeline

0 – 9 months | **10 – 18 months** | 19 – 36 months

Level of Effort

Low | **Medium** | High

- **Communications Plan:** 2 FTEs (1 month)
- **Job Leveling & Titling Structure:** 2 FTE for 6 months to apply titles across VT.
- **Map Position Titles to Functional Areas:** 2 FTE for 3 months to review.
- **Pay Architecture Design:** 4 FTE and 10 months to complete classification and compensation analysis.
- **Career Paths**: 1 FTE (2 months)
- **Employee Transition Plan:** 3 FTEs (3 months)

Risks / Dependencies

Low | **Medium** | High

- Staff activity analysis is a prerequisite to facilitate an understanding of the full scope of IT staff activities undertaken at Virginia Tech.
- Change management best practices will be required to support any staff transition.
- Colleges and IT units that are cohesive today may resist alignment into standardized roles and responsibilities.
- The effectiveness of newly defined roles and responsibilities can be supported through a more robust Operating Model (see recommendation 1.1), IT governance model (see recommendation 1.2), and a new organizational chart for DoIT (see recommendation 3.1).

Assumptions

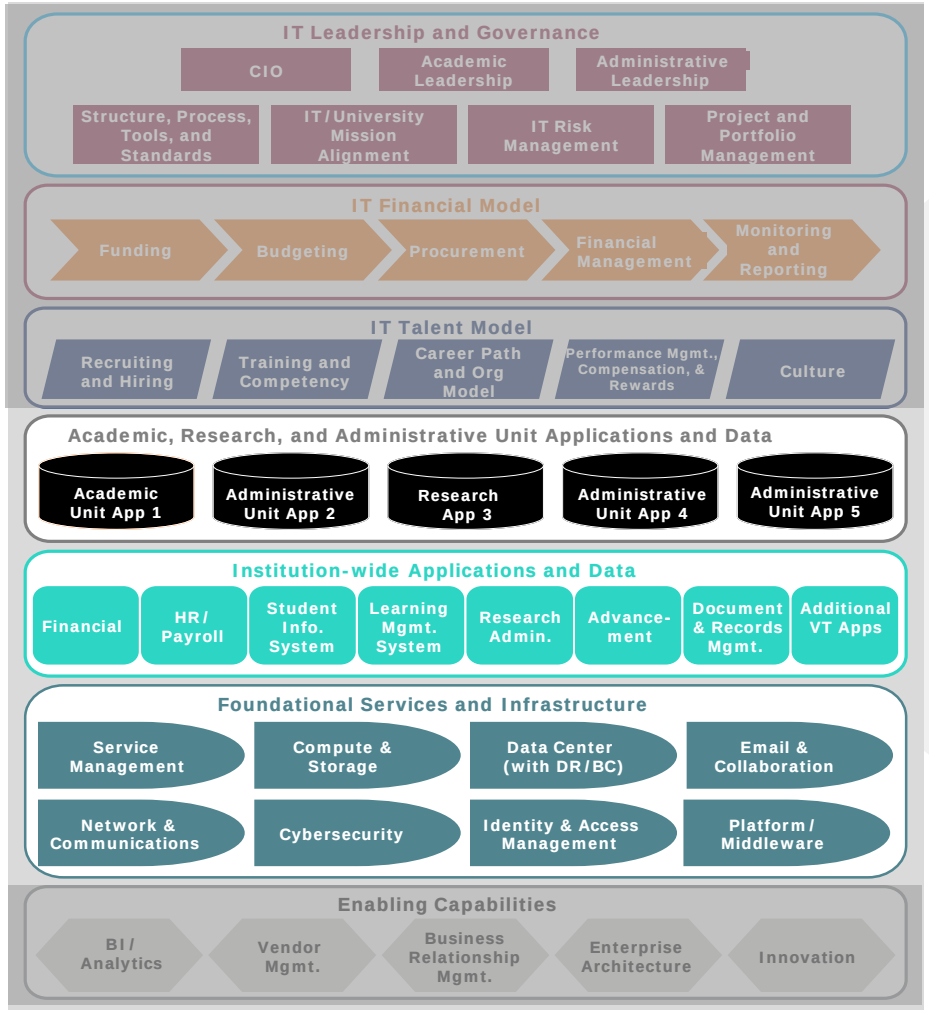
- IT job role standardization will allow information to flow more freely across IT units as a part of a more cohesive IT environment, resulting in greater collaboration.
- Some implementation activities such as mapping position titles to functional areas can be conducted in parallel to organizational model revision.

*Market salary averages predicted to remain volatile over next few years, which may call for compensation studies to be conducted more frequently to most accurately assess market compensation changes.

Technology Capabilities

Technology Recommendations

These opportunities allow VT to modernize its technology services through key operational improvements and strategic enhancements.



4.1 Enhance data governance to enable greater access, reporting, quality, and clarity over data roles and responsibilities

- Defines data governance and matures data warehousing capabilities to assist in data quality and availability, and research data management University-wide.

4.2 Deploy a common integration layer to enhance data sharing across systems

- Adopts a single middleware application to improve application functionality through data consistency across distinct application environments

4.3 Rationalize application portfolio across VT

- Eliminate redundant and unsupported software applications and deploy modern applications to meet unmet user needs

4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities

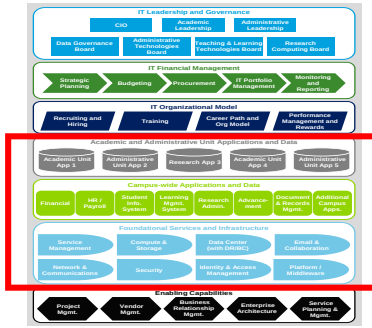
- Creates cost efficiencies for data storage through economies of scale and establishes centralized solutions for IT Units.

4.5 Define strategy for effectively adopting managed services and SaaS solutions

- Increases effectiveness of IT management and standardizing processes to create a wholistic view of services.

Technology Overview

For the Technology analysis, we dove a layer deeper into our IT Transformation framework to identify the core layers of the technology stack.



- The layers of particular interest for this thread of analysis included:
  - Data Center Infrastructure
  - Network and Unified Communications
  - Compute Services
  - Application Platform Services
  - Information Integration

College / unit - Specialized Applications

Facilities Mgmt. | Scheduling Apps | Clinical / EMR | GIS | Research Tools | Modeling Apps

Enterprise Applications

Administration | Student Information | Operations | Grants | Advancement

Information Integration

BI/Visualization | Data Warehousing

Teaching & Learning Applications

LMS | Application Delivery | Library, Collections | Online Courses

Application Platform Services (Middleware)

Authentication/SSO | Application Servers | Database Management | Web Content Management | Brokers/Agents | Integration APIs | ETL | Platform as a Service

Electronic Collaboration Services

Document/Record Management | E-Mail, IM, Presence | Conferencing

Classroom Technologies

Video Capture | Labs

Storage Services

Storage Subsystems: Provisioning, Backup/Restore, Archiving, Records Management

SAN | Media Storage/Retrieval | Cloud Storage

Compute Services

OS Virtualization and Clustering

Mainframe | General - Purpose Servers | Performance Servers | Cloud Hosting

Networking and Unified Communications Services

Voice | Video | Data | Internet Access

Transport Services: Fiber, Wired, Wireless

Data Center Infrastructure

Fault Tolerance | Environmental Control | Power | Asset Protection

Security

System Management and Recoverability

4.1 Enhance data governance to enable greater access, reporting, quality, and clarification over data roles and responsibilities

Define data governance and modernize data warehousing capabilities to assist in data quality and availability, and research data management University-wide.

Problem Statement / Current State

- A data governance committee and data policy is present; however, communication and enforcement of policy throughout IT units is not effective.
- Data documentation on data models and data dictionaries can be too technical for some users to fully understand.
- Data requests follow a manual, paper-form process within the Banner ERP system and is college or unit-specific between 25 domains, creating time-consuming data access constraints.
- Interviews indicated that data quality is often affected by the inconsistent access methods and manual reporting due to issues with tools.
- VT has a centralized analytics solutions, such as MicroStrategy; however, many IT units are lacking in talent and skills to communicate and support all IT units using them.

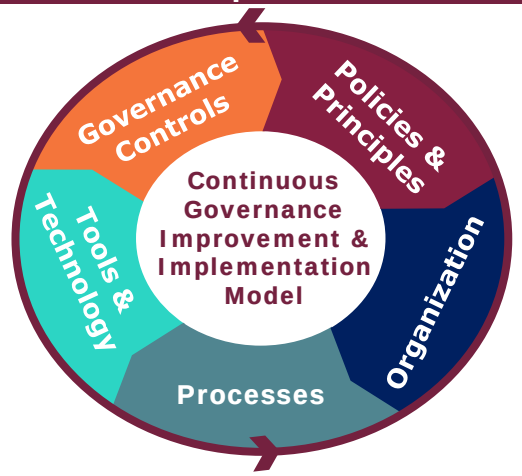
Summary Description

- Formalize a VT-wide data governance model that provides data access processes, standardizes data definitions, defines data ownership, and provides clear understanding of data sources.
- Improve data access processes via ServiceNow workflows and better communicated processes.
- Establish data and BI training to use the available tools and resources.

Expected Benefits

- Improved data quality, access, and management.
- Improved data security with VT-wide standard data policies.
- Lessened IT sprawl as it relates to data reporting and analysis with minimal manual intervention.
- Improved overall data reporting and business intelligence skills within units and colleges.
- Trust in data analysis and reports produced, leading to data-driven decision-making that creates consensus and confidence.

Conceptual Model



4.1 Enhance data governance to enable greater access, reporting, quality, and clarification over data roles and responsibilities

Define data governance and modernize data warehousing capabilities to assist in data quality and availability, and research data management University-wide.

Implementation Activities

- Document a detailed data strategy that:
  - Supports the governance model, fosters alignment to current needs, future requirements, and identified technology trends.
  - Includes a data protection strategy, inclusive of defining sensitive data classifications, establishing data security policies, and adherence to all applicable state and federal data security requirements.
  - Identifies opportunities to leverage cloud-based data technologies based on current data requirements and future state visioning and provides a process to evaluate them.
  - Defines how to create common and standard data reports and models that can reflect a single source of data for VT.
  - Strengthens research data management (RDM) for all researchers.
- Develop training program for staff to leverage data/BI capabilities rather than developing shadow systems for reconciliation, etc.
- Continue to meet with necessary stakeholders to refine data governance strategy and mature process for continuous improvement.

Success Metrics

- % reduction in use of alternative BI tools across the University
- % increase of data stored in central data warehouse

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | Medium | High

- **Data Governance:** 2 FTEs to develop processes and policies (6 weeks)
- **Data Protection Strategy and Implementation:** 3-5 FTEs experts in Data Security (6-9 months)

Risks/Dependencies

Low | Medium | High

- Implementation of data governance will help streamline and facilitate discussions around central IT policies regarding data.
- Participation and buy-in from colleges and units around data strategy, processes, and policies will be required.
- The prevalence of shadow systems across the University presents a risk for data management.
- Development of new data governance model should align with development of an overarching University-wide IT governance model (see recommendation 1.2).
- This effort could leverage the structures in place through the current University Data Governance Council to support this effort.

Assumptions

- Implementation efforts for strategy and policies are supported by VT leadership and Division of IT.

4.1 Enhance data governance to enable greater access, reporting, quality, and clarification over data roles and responsibilities

The conceptual model below displays the key areas of improvement necessary for an organization to continuously maintain standardized data governance.

Governance Controls

Identifies the most important activities to be performed, measures progress towards achieving objectives, and determines how well the governance and its processes are performing.

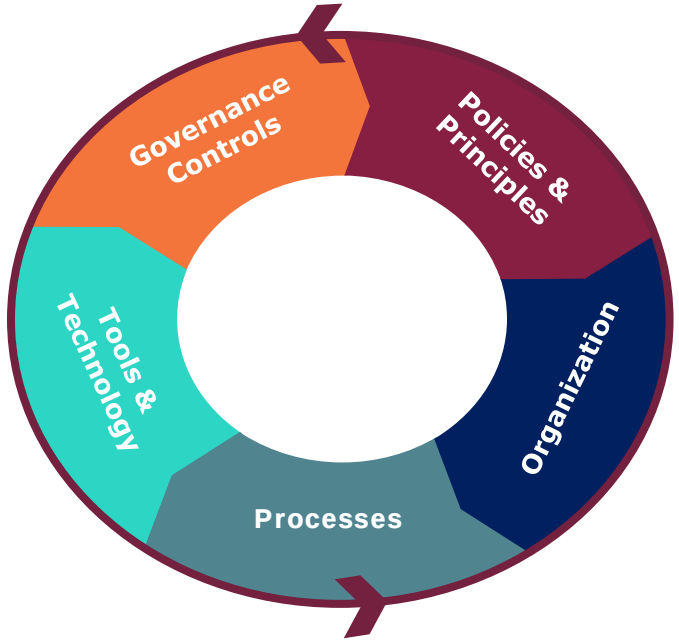
Tools & Technology

Establishes data models, high-level architecture requirements, implementation options, and roadmaps to enable enforcement and adherence to standards.

Continuous Governance Improvement

Establishes ways to review adherence to data management standards and processes, initiates improvement activities.

Continuous Governance Improvement and Implementation Model



Policies & Procedures

Guidelines and principles for enforcing data management standards and data governance processes.

Organization

Establishes roles and responsibilities, organization structure, and clear ownership for data management practice.

Processes

Outline how data is created, modified, and maintained, enabling accurate data to be leveraged across the University.

Implementation Model

Includes implementation patterns, methods, and engagement models.

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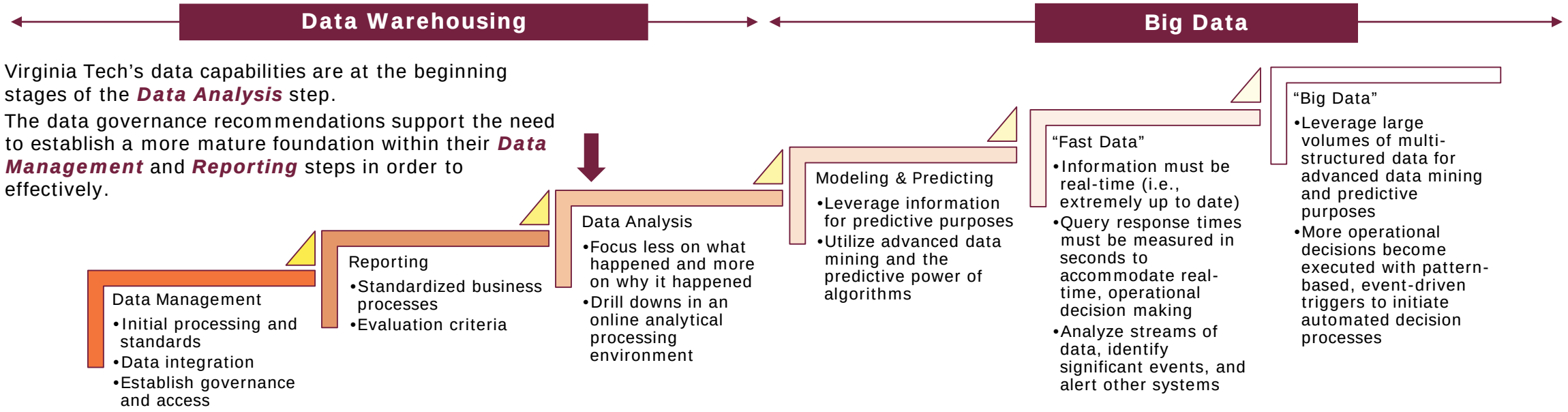
4.1 Enhance data governance to enable greater access, reporting, quality, and clarification over data roles and responsibilities

Data capabilities can mature sequentially over time to enable greater predictive insights, agility, and scale. As illustrated in the model below, the first step is promoting more effective governance and integration.



- Initial stages need to be fully developed in order to successfully accomplish next stage.
- Maturity often occurs at differing paces across higher education institutions.
- A key challenge is to orchestrate the journey in a way that optimizes foundational investments.
- Nearly all universities are at different stages of this progression in different areas of their institution.

4.2 Deploy a common integration layer to enhance data sharing across systems

Adopt a single middleware application to improve application functionality through data consistency across distinct application environments.

Problem Statement / Current State

- The integration of college and unit-specific information data via centralized data warehouse and Banner supports VT's University-wide reporting and analytics.
- VT is currently expanding a centralized data lake – integrating additional applications: Kaltura, Canvas, Slack, and LinkedIn Learning, among others.
- There is little to no APIs[1] in use for many systems' data integration – exporting data is done manually in many cases.
- VT is currently improving their MicroStrategy integration with other analytics tools such as Tableau and Microsoft PowerBI.

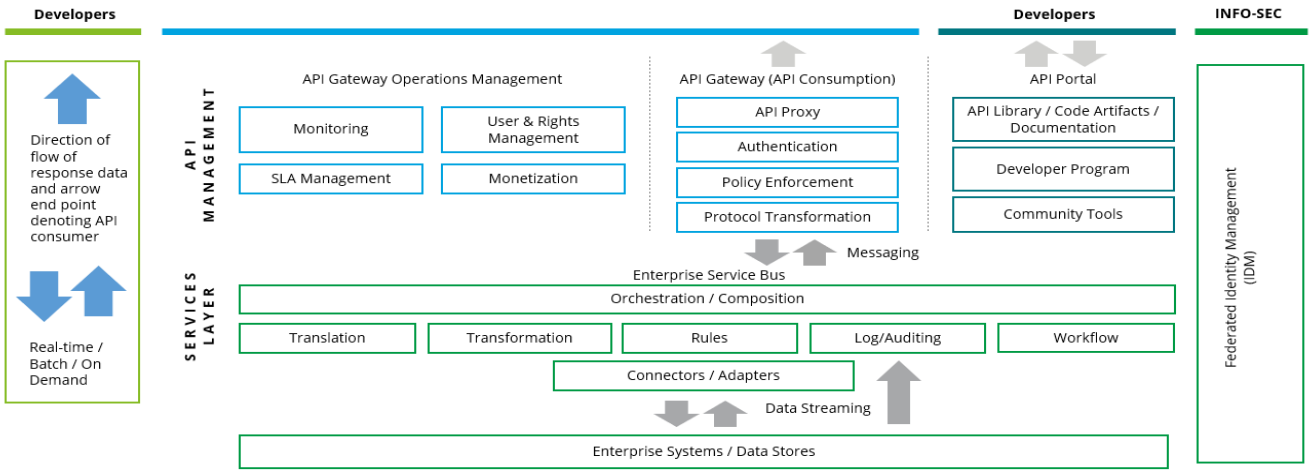
Summary Description

- Focus on extensibility of data integration platforms to keep up with end point variety and complex business processes.
- Factor scale and complexity in data integration design as traditional and non-traditional sources of data grow exponentially.
- Build data lifecycle management & governance into integration services to align with security & regulatory requirements.

Expected Benefits

- Establishes a standard platform for integrating common data between disparate systems and applications.
- Allows for a robust, flexible, and scalable foundation capable of meeting current and future integration trends around Cloud Proliferation, IoT, and Data-as-a-Service.

Conceptual Model



[1] API – Application Programming Interface: a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service.

4.2 Deploy a common integration layer to enhance data sharing across systems

Adopt a single middleware application to improve application functionality through data consistency across distinct application environments.

Implementation Activities

- Continue efforts currently underway to define API platform standards and define high-level integrations, key decisions, guiding principles, and assumptions for in-scope applications.
- Develop high-level platform requirements.
- Inventory current middleware/integration tools utilized.
- Research and identify integration tools from various vendors to meet requirements.
- Design interfaces to facilitate communication between new and established University-wide systems.
- Develop and test API's/services across on-premises and cloud systems.
- Establish regular ongoing governance and demand planning meetings.
- Deploy University-wide integration layer to all necessary systems.
- Decommission legacy middleware replaced by common integration layer.

Success Metrics

- Reduction in deployment time for new products
- # of middleware integration tools being utilized across the University
- % of middleware integration layers being utilized across VT

Implementation Timeline

0 – 9 months | **10 – 18 months** | 19 – 36 months

Level of Effort

Low | **Medium** | High

- **Middleware current state analysis:** 1 FTE (2 weeks)
- **Middleware vendor analysis:** 1 FTE (2 weeks)
- **Integration layer design:** 5-6 FTEs (6-7 months)
- **Integration layer implementation:** 5-6 FTEs as needed (12 months)
- **Legacy tool decommission:** 3-4 FTEs (3-4 months)

Risks / Dependencies

Low | **Medium** | High

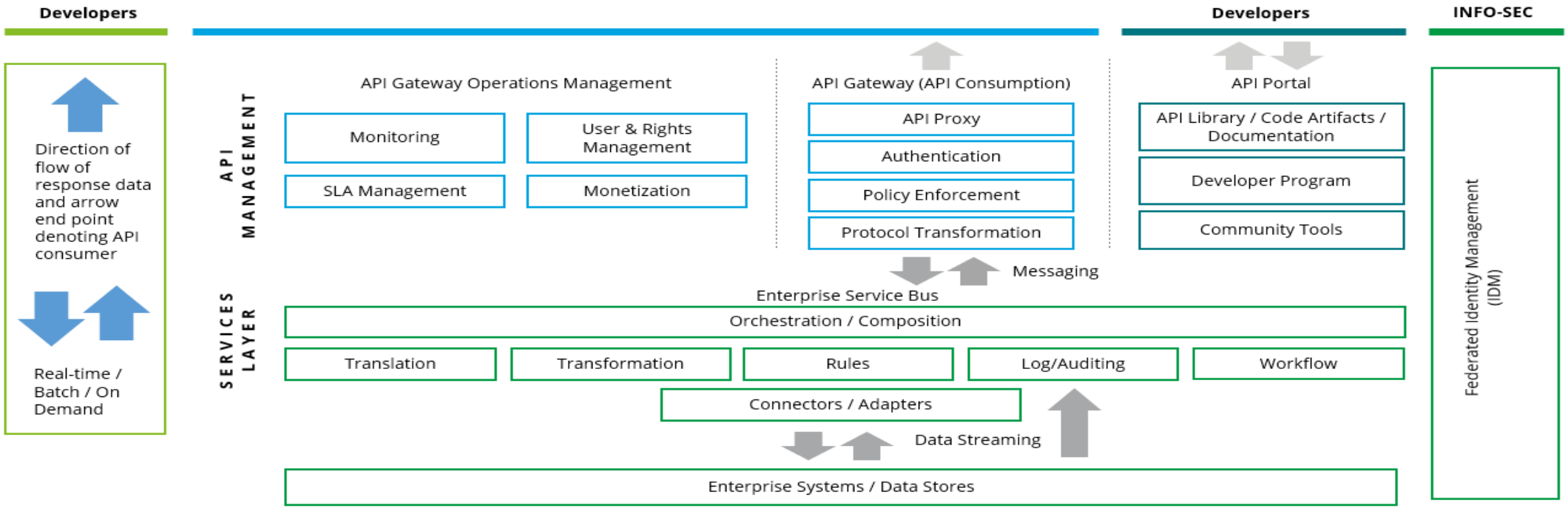
- Implementation of IT governance (see recommendation 1.2) will help facilitate University-wide decision making around application adoption.
- Participation and buy-in from individual units and colleges around strategy development and implementation.
- Upgrades to additional pieces of infrastructure or application architecture may be required.

Assumptions

- IT staff are knowledgeable on integration layer deployed across the University.
- Planned implementations and deployments work in conjunction and with consideration of previously conducted Service Operating Models (SOM), service categorizations, and ServiceNow catalogs.

4.2 Deploy a common integration layer to enhance data sharing across systems

The graphic below shows a conceptual model of how an integration layer fits between system data and application APIs[1] in order to create an efficient and consistent method of data sharing.



- Data is currently maintained in a mix of centralized systems and silos, with multiple individual integrations within various systems.
- VT would benefit from a single middleware application, designed to provide a standard platform for integrating common data between disparate systems and applications.
- By implementing a single middleware application, VT will establish a robust, flexible, and scalable foundation capable of meeting current and future integration trends around Cloud Proliferation, IoT, and Data-as-a-Service.

[1] API – Application Programming Interface: a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service.

4.3 Rationalize application portfolio across VT

Eliminate redundant and unsupported software applications and deploy modern applications to meet unmet user needs.

Problem Statement / Current State

- Multiple cases of applications and systems sprawl between IT Units were identified during faculty interviews, data collection, and reviewing survey responses:
  - Two email applications – Google Mail and Microsoft Exchange.
  - Multiple video and collaboration tools.
  - ServiceNow is the centralized ITSM application, but at least 5 others are in use by distributed IT units.
- No central application repository exists, making it difficult to identify known solutions and has led to duplicative purchases and in-house app development.

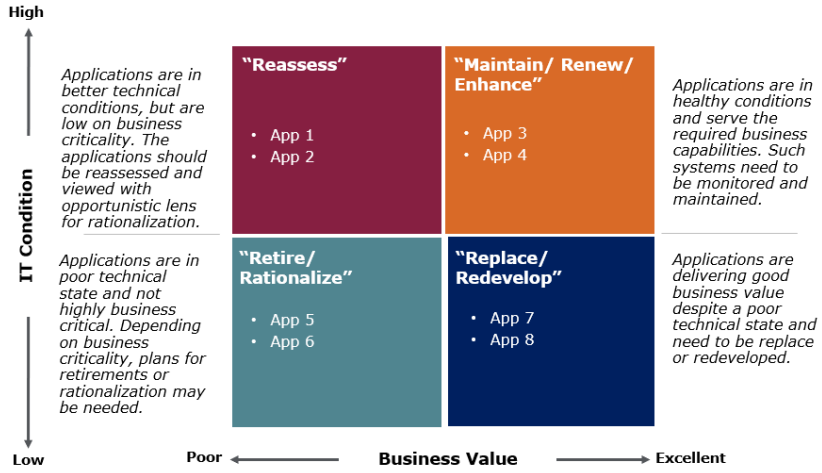
Summary Description

- Consolidate full list of applications in use between IT Units.
- Create a strategic roadmap for each application and system software in use today, with specific plans for the following actions:
  - Replace software that is unsupported.
  - Reduce similar products and versions to one or two options.
  - Evaluate migration/replacement alternatives for platforms reaching end of life.
  - Prepare transition to newer technology.
- Design a streamlined application architecture.
- Migrate legacy applications to new architecture as well as strategic COTS or cloud services.

Expected Benefits

- Reduces platform variations, simplifying administrative support and enabling availability of security updates/fixes.
- Focuses on fewer products, providing leverage for central purchasing, with savings passed on to all units.
- Reduces procurement requests, elevating ITPALs workload for more focused and efficient procurements.
- Increases collaboration between IT teams on projects and maintenance by using common platforms across central and distributed units.

Conceptual Model



4.3 Rationalize application portfolio across VT

Eliminate redundant and unsupported software applications and deploy modern applications to meet unmet user needs.

Implementation Activities

- Define rationalization criteria, framework, and process for consistent review of applications.
- Create working groups by application type to address application specific needs (Ex. E-mail, ITSM, Collaboration tools)
- Develop complete analysis of application portfolio, including technical data, stakeholders, functions, costs, and business risk.
- Map each application to its business use and functionality to identify duplication.
- Identify platform product versions and end-of-support dates.
- Identify strategic options including SaaS as well as on premise products.
- Determine the cost-benefit for application consolidations (e.g., one-time cost, cost of support, savings provided).
- Develop application portfolio future state and supporting business case.
- Develop application migration/sunset roadmap.
- Define change management processes and roles to manage unit change.
- Explore volume licensing for strategic products; procure licenses.
- Manage migrations to focused set of products.

Success Metrics

- Reduction in redundant license purchase costs
- Reduced proportion of custom vs. COTS/SaaS applications

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | Medium | High

- **Application analysis/rationalization:** 1-2 IT FTEs, plus part-time unit SMEs for 2 months (see assumptions)
- **Application migration, and consolidation:** TBD FTE, depending on number of applications and size of user base identified for transformation, 20 months

Risks/Dependencies

Low | Medium | High

- Migration timeline could be affected by number of application users and lack of knowledge of legacy applications architecture.
- Consolidating college and unit applications may be cost prohibitive if a funding model is not defined (see recommendation 2.1).
- This effort can leverage existing analysis/ strategy developed to explore rationalizing current e-mail environment.

Assumptions

- VT Colleges, Institutes and units will continue to maintain their unique mission-driven applications.
- FTE counts for analysis rationalization phase assumes majority of data is available and VT prioritizes 2-3 application categories.
- As it related to rationalizing email solutions, VT should leverage any existing work and analysis underway in evaluating the current Google and MS 365 offerings.

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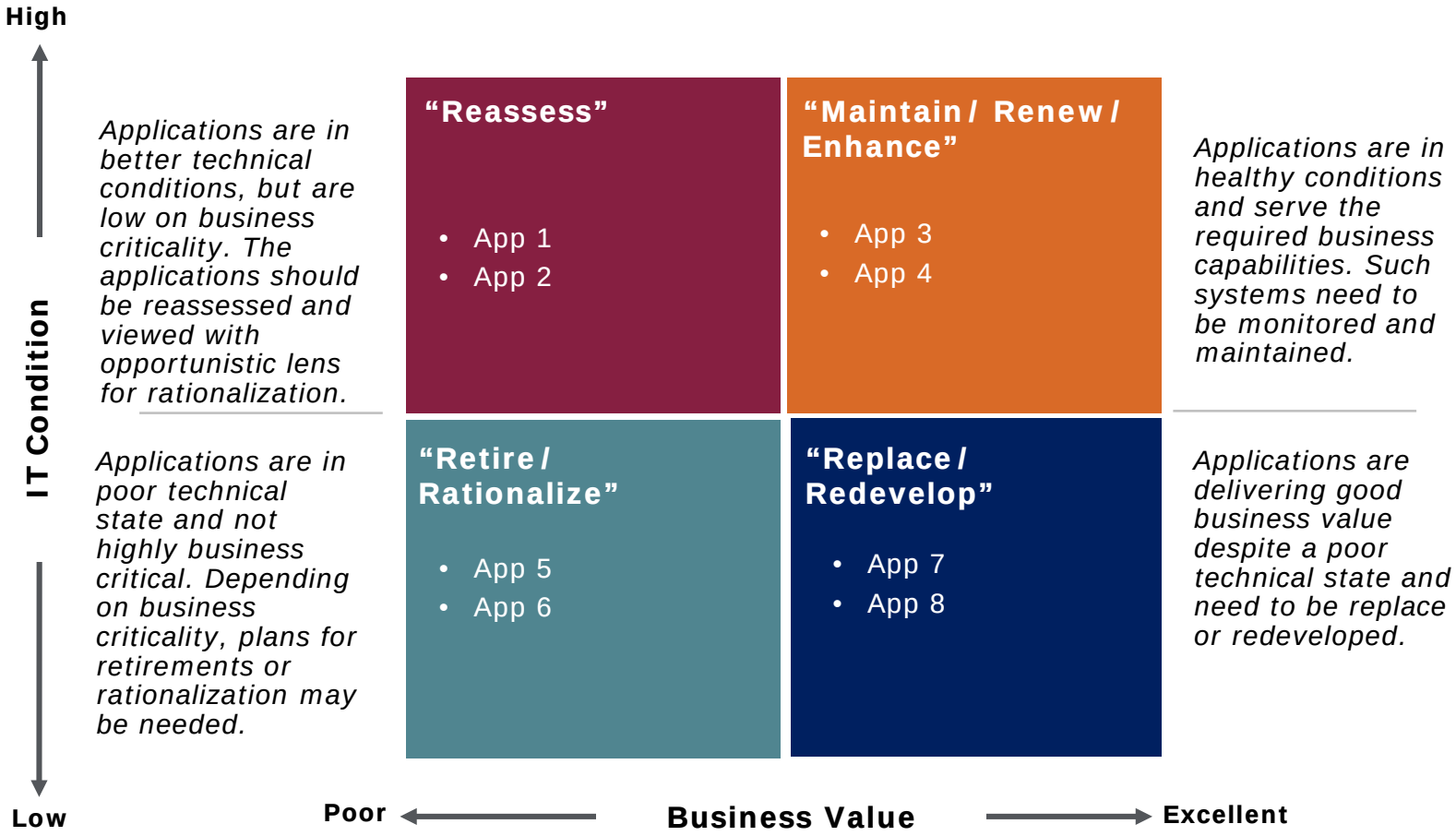
4.3 Rationalize application portfolio across VT

The conceptual model below serves as a rationalization guide that groups applications by IT Condition and Business value in order to assign applications to their necessary actions.



4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities

Create cost efficiencies for data storage through economies of scale and establishes centralized solutions for IT Units.

Problem Statement / Current State

- Surveys identified 8 IT Units managing 13 data centers and server rooms separate from the centrally managed facilities.
- Low utilization of the AISB data center indicates an opportunity to co-locate smaller, on-premise servers to a centrally managed data center.
- No standard guidance specifically for Cloud governance and security control requirements.
- Cloud baseline configuration standard and new cloud contracts are under development.
- VT's University-wide cloud strategy development began in 2019 but has shown little to no action since it's publishing in February 2021.

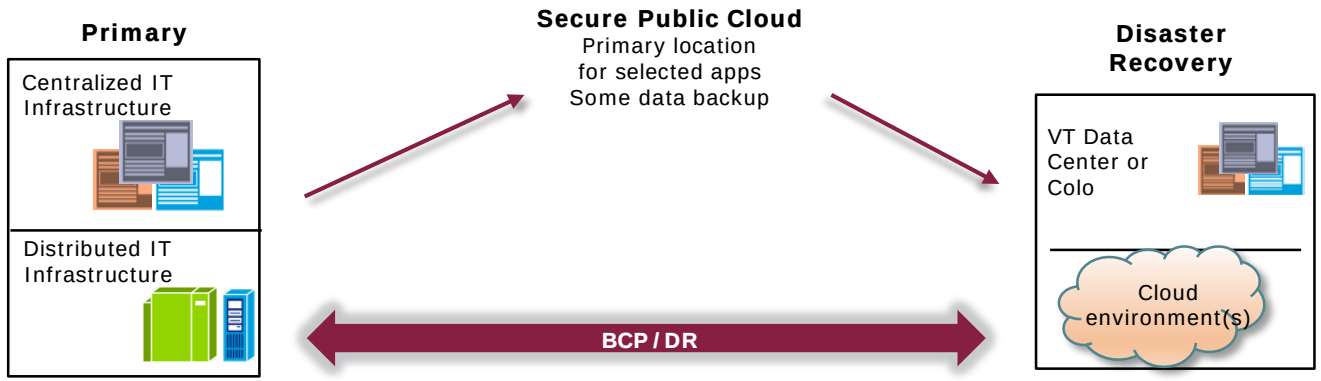
Summary Description

- Rationalize a baseline for which distributed data centers and server rooms should be hosted within the centralized AISB data center, which institution and research solutions should remain decentralized, and if data storage would benefit from cloud hosting solutions.
- Consolidate existing decentralized administrative data centers and server rooms into the main AISB facility or determine if cloud hosting solutions should be explored.
- Implement a system-wide cloud computing strategy, including a cloud policy and cloud brokerage capabilities covering approved cloud vendors, usage, and process for acquiring cloud instances.

Expected Benefits

- Reduces risk, increases accuracy in refresh cycles and capacity, and enhances accuracy in reporting.
- Reduces college and unit IT server and network administration efforts.
- Best-in-class IT services enabled through cloud computing.
- Standardized cloud architecture that is commonly agreed upon and adhered to throughout VT.
- Cloud offerings that align with business strategy, business process, and overall IT strategy.
- Potential financial savings through the use of University-wide cloud licensing.

Conceptual Model



4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities

Create cost efficiencies for data storage through economies of scale and establishes centralized solutions for IT Units.

Implementation Activities

Cloud

- Leverage current cloud initiatives (e.g., VT's Cloud Strategy)
- Define objectives and business drivers for cloud; validate business and IT requirements.
- Establish standardized architecture to support the organized migration of applications and systems to the cloud.
- Create a cybersecurity framework for workload types that can be migrated to the cloud.
- Conduct analysis of current cloud instances compared to VT requirements and consolidate or retire where applicable.
- Develop processes for acquiring cloud instances and cloud usage policies.
- Evaluate applications and infrastructure to determine suitability for cloud platform options and migrate selected applications to designated cloud environments.

Data Center

- Conduct assessment of decentralized data centers and server rooms to determine which facilities should be collocated and maintained centrally.
- Conduct inventory and gather requirements for IT infrastructure and applications not being absorbed into cloud.
- Consolidate distributed administrative IT infrastructure remaining into the VT AISB Facility Decommission legacy data centers and distributed server rooms.

Success Metrics

- % of applications where cloud hosting was evaluated
- # of data centers across VT

Implementation Timeline

0 – 9 months | 10 – 18 months | **19 – 36 months**

Level of Effort

Low | Medium | **High**

- **Cloud Architecture and Security Framework:** 1-2 FTEs for 6 months
- **Cloud Transitions:** 3-4 FTEs for 9 months
- **Data Center Consolidation Planning:** 4 FTE for 4-6 months
- **Data Center Consolidation and Reclassification:** 3 FTE for 18-24 months, with additional part-time data center resources to help conduct transition of equipment

Risks / Dependencies

Low | Medium | **High**

- Enhancement of IT governance (see recommendation 1.2) will help facilitate University-wide decision making around consolidation.
- Cloud platform-specific training will be required to enable users and support staff.

Assumptions

- Cloud options will be identified to meet cybersecurity requirements.
- Legacy systems will be modernized in order to be migrated to the cloud.
- Efforts will leverage VT's efforts around establishing Cloud Computing for Research and Training.

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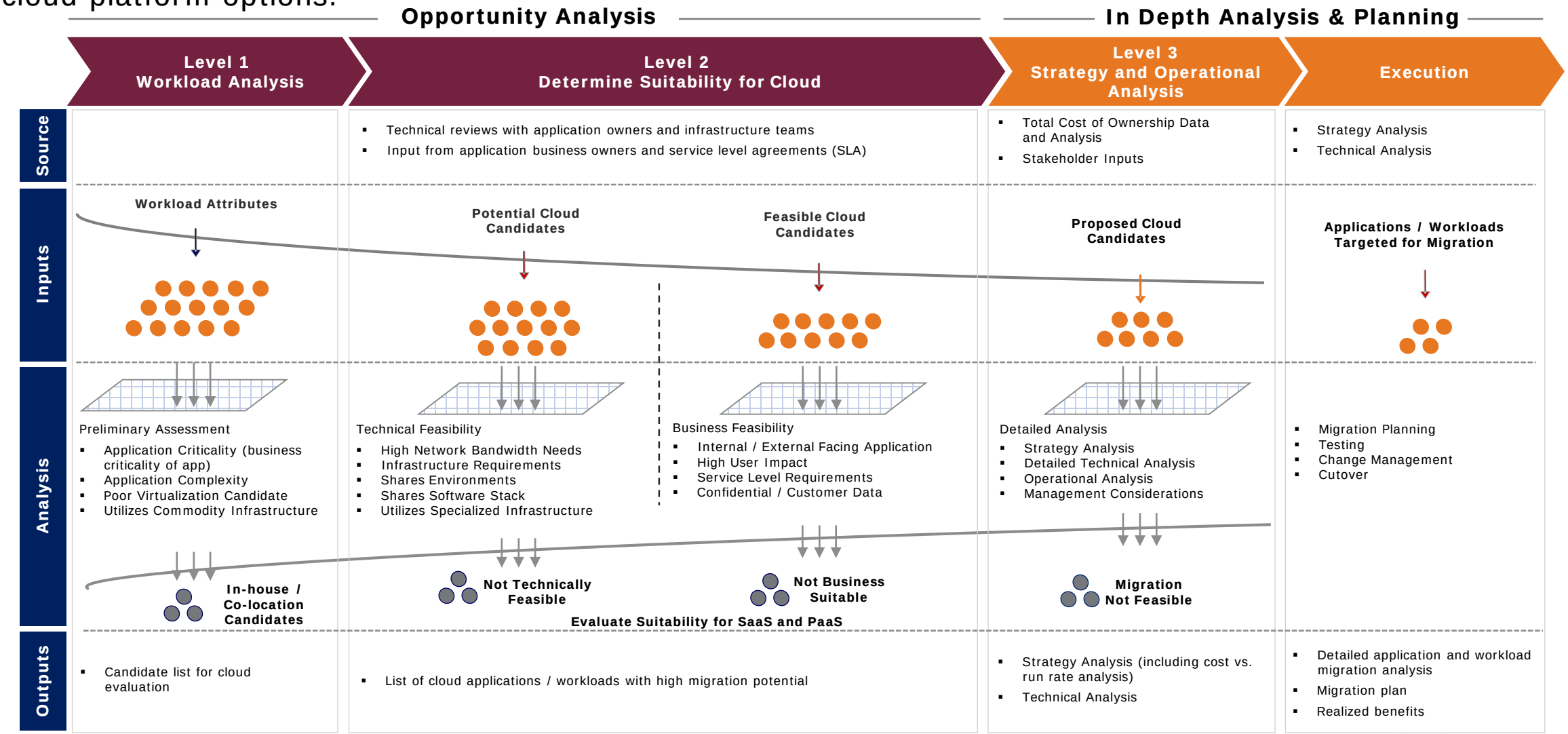
4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities

The model below provides guidance on evaluating applications and infrastructure to determine suitability for cloud platform options.



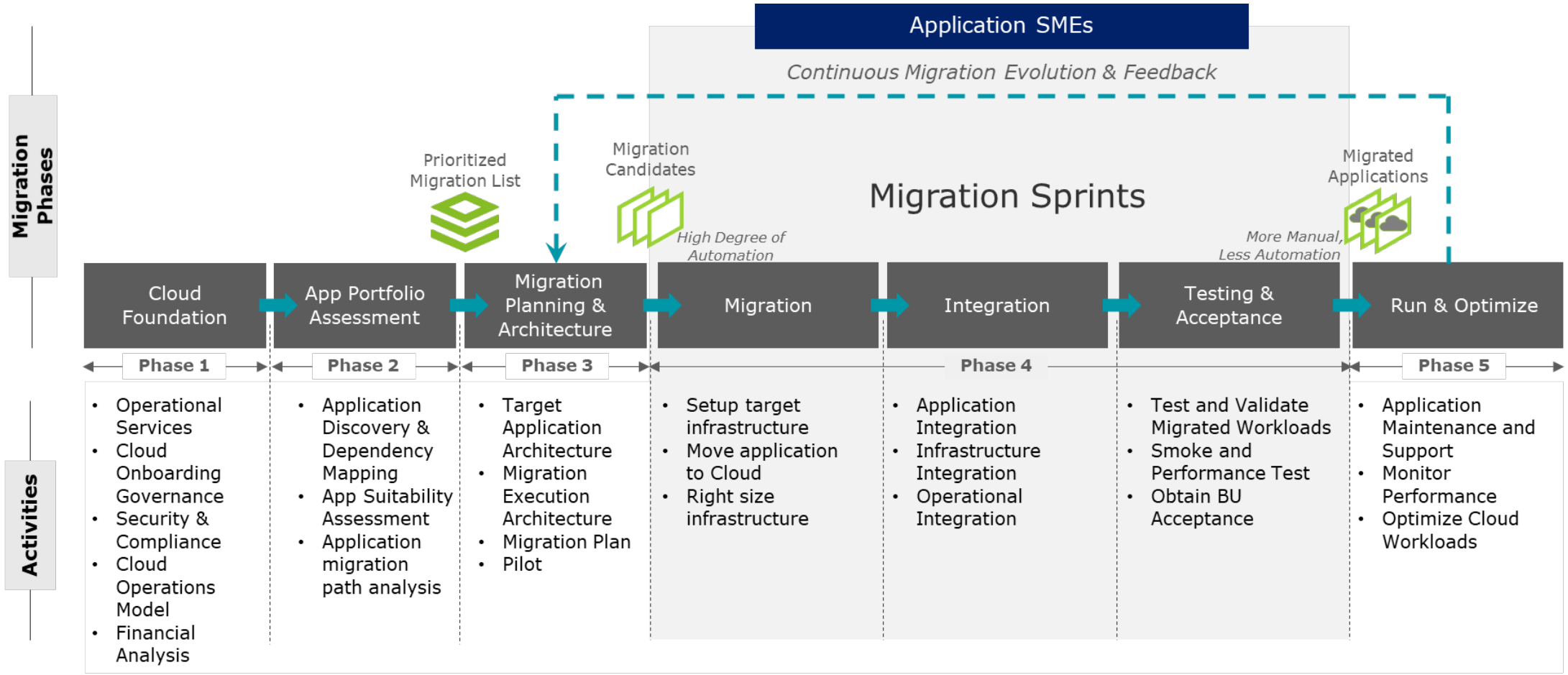
4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities

Cloud suitability analysis should be performed based on multiple technical and business parameters.

	Criteria	Explanation
Level 1 Workload Analysis	**Application Criticality**	Defined by business for production environments, e.g., High, Medium, Low.
	Application Complexity	Architecture complexity, dependencies on other applications, databases, middleware, etc.
	Virtualization Candidate	Can the workload be virtualized? This depends on the platform OS and virtualization platform.
	Commodity Infrastructure	Workload runs on commodity infrastructure (e.g., x86 servers).
Level 2 Determine Suitability for Cloud	**Technical Feasibility**	
	Network Bandwidth	LAN or WAN network bandwidth requirements when workload would run in the cloud.
	Infrastructure Requirements	The scale of requirements for compute, storage and network to support workload.
	Shared Environments	Example, both UAT and DR is supported by a shared environment.
	Shared Software Stack	The workload shares software stack (e.g., databases, middleware) with other workloads.
	Specialized Infrastructure	Dependency on special purpose proprietary appliances, devices, license dongles tied to hardware, etc.
	Business Feasibility	
	Internal / External Facing	Does the application provide a customer facing service or back-office function (e.g., HR)?
	User Impact	Impact on the user community due to move of workload to cloud (e.g., lack of access to a subset of users).
	Service Level Requirements	Availability, response time, Recoverability (e.g., RTO/RPO), Disaster Recovery, etc.
	Customer / Confidential Data	Does the provider location or other characteristics of the cloud service meet the requirements of how and where data needs be stored?
Level 3 Strategy and Operational Analysis	**Strategy Analysis**	Cost / benefit analysis, including initial and migration costs, ongoing costs and ROI timeframe.
	Detailed Technical Analysis	What changes will be required for the application? What will the future application architecture look like?
	Operational Analysis	What is the operational impact due to the workload moving to cloud? What is support model after workload is moved to cloud? What is provider vs. client responsibility and hand-offs?
	Management Considerations	How is the cloud workload managed? E.g., using internal and vendor provided tools, processes, and staff.

4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities

The following conceptual model offers a framework to plan and execute sprints for migrating workloads to the cloud.



4.5 Define strategy for effectively adopting managed services and SaaS solutions

Increase effectiveness of IT management and standardizing processes to create a wholistic view of services.

Problem Statement / Current State

- VT's IT units are reportedly experiencing attrition and are struggling to adapt to a competitive market.
- Anecdotal reports during interviews with VT's IT units and colleges detailed widespread custom application development that are affected by attrition and inconsistent support.
- There are increasing demands that require staff to work in additional roles not within job scope.
- Services such as a Network Operations Center (NOC) and Security Operations Center (SOC) are lacking at Virginia Tech and are prime candidates for managed services.
- VT does not have an integrated approach to SaaS or managed services.

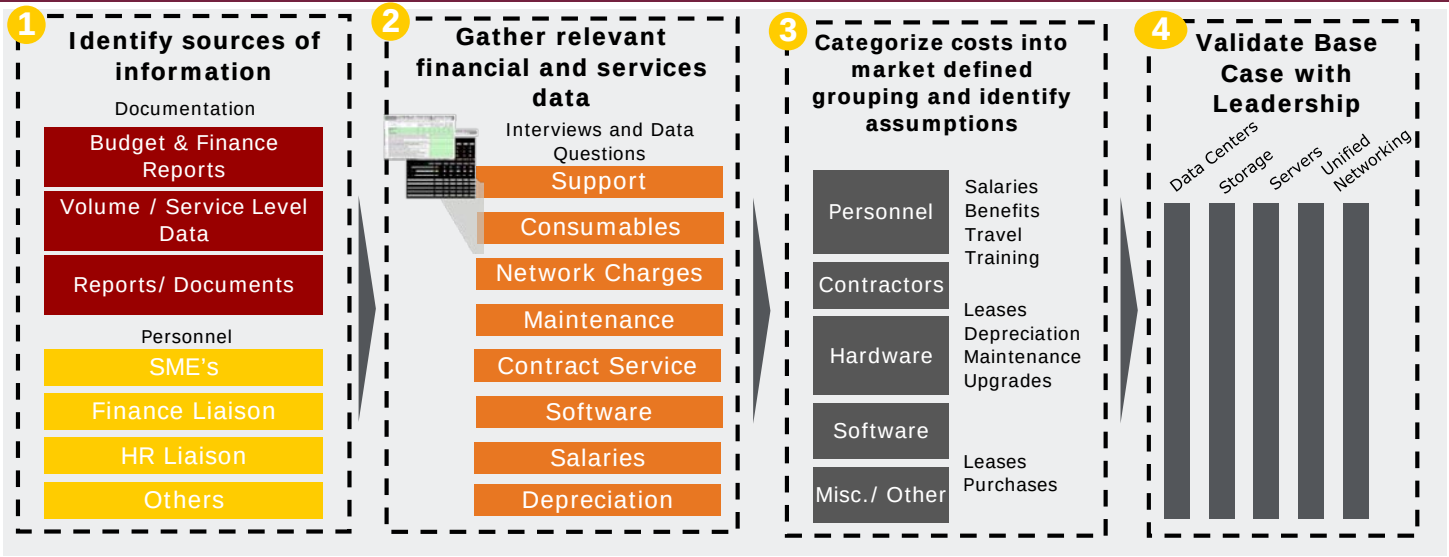
Summary Description

- Managed services can be used for certain areas of DoIT to supplement the existing supplement labor pool.
- Utilizing managed services can help with areas of the organization that have wide swings in demand or demand for services during off hours.
- Service level agreements must be put in place and actively managed to make certain services are delivered according to expectations to meet the needs of campus end-users.

Expected Benefits

- Decreased costs for services that are pay per use or that can be provided in a shared pool; increased reaction times to scale up the number of resources for peak periods.
- Improved service levels to meet the needs of users and enable services that can be provided around the clock and on weekends.
- Utilizing managed services for resources with specialty skills for newer technologies.

Conceptual Model



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4.5 Define strategy for effectively adopting managed services and SaaS solutions

Increase effectiveness of IT management and standardizing processes to create a wholistic view of services.

Implementation Activities

- Establish a working group comprised of Division of IT and distributed Unit IT to evaluate opportunities for managed services and identify VT point of contact who will be accountable for managed services meeting VT's needs and evolve as the University evolves.
- Identify sources of information and gather financial data, service level data and other reporting documentation.
- Gather service level benchmarks systems and relevant financial data to compare.
- Evaluate how services are provided against the criteria and determine if the service would be a potential candidate for managed services.
- Investigate the success of other R1s to determine the pros and cons of managed services relationships by each service.
- Categorize costs and service level requirements for select services.
- From the list of potential managed service offerings, evaluate the costs of vendor provided services and the service levels available.
- Implement managed services for the candidate services.
- Determine handoff guidelines and SLA's and implement services.

Success Metrics

- # of services delivered by the managed services provider
- % increase of service level compliance for services provided

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | **Medium** | High

- **Identify sources of information:** 1 IT Strategy, Planning & Analysis FTE for 2 months
- **Gather benchmarks:** 1 IT Strategy, Planning & Analysis FTE for 1 month
- **Categorize costs:** 1 IT Strategy, Planning & Analysis FTE for 2 months
- **Implement Managed Services:** 1 IT Strategy, Planning & Analysis FTE for 12 months

Risks / Dependencies

Low | **Medium** | High

- Dependent on the strategy of the Institution to make managed services more widely utilized.
- There is a risk that the staff will be resistant to adopting managed services that will negatively impact the culture.
- Overseeing managed services contracts can take a lot of time and making sure that the vendors are meeting the service levels can be a risk.
- The contracts for managed services must be very clearly documented to make certain there is no dispute over the services that are in the contract and those services that are not included and may be an extra charge to deliver.

Assumptions

- Management has determined that managed services is the strategic direction for some services delivered.
- Managed service vendors can deliver improved services at a lower cost.
- There will be increasing demand for services during off hours as VT provides support to international users.

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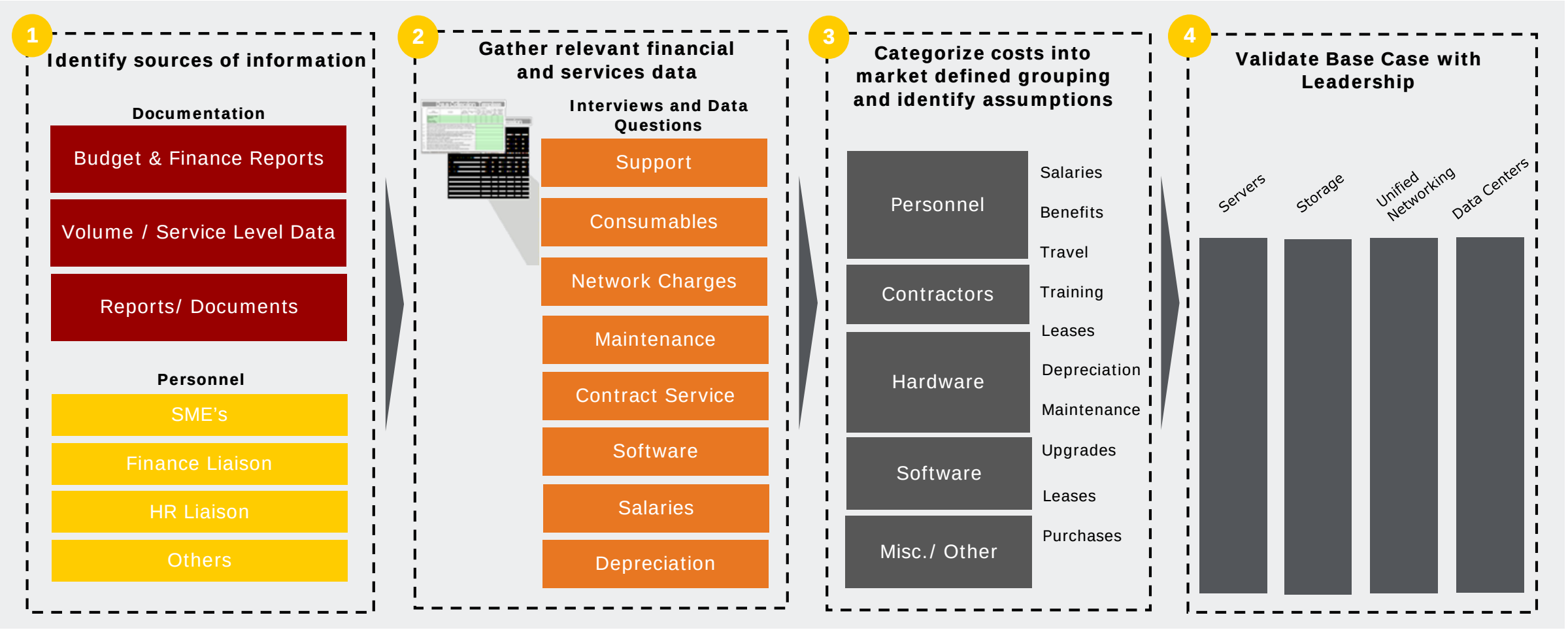
4.5 Define strategy for effectively adopting managed services and SaaS solutions

The conceptual model below describes the necessary steps in order to evaluate whether an organization's service has can be outsourced as a managed service or to a SaaS solution.



4.5 Define strategy for effectively adopting managed services and SaaS solutions

The table below assesses whether core services might be candidates for managed services based on our experience with other institutions.

General Assessment		Candidate for Managed Services
Application Development	Application Development is a good candidate because the application development is project based with defined scope and schedule.	◕
Application Support	Application Support can be provided through managed services if proper training and SLA's are in place to make certain services levels stay the same or increase.	●
Business Relationship	Business Relationship Management requires understanding of Unit and Administrative needs, not well suited for managed services.	○
Communications	There may be some areas of standard communications that can leverage managed services however most Communications requires closer association with staff.	◑
Email and Collaboration	O365 and Collaboration Tools are essentially sourced to Microsoft and generally take little administration effort which could be sourced, although issue response time is critical.	●
University-wide Data and Analytics	Not a good candidate because of the need for detailed knowledge of data.	◔
High Performance Computing	HPC is generally does not leverage managed services because of the rapid provision times and many special requests for HPC services.	◔
Identity and Access Management	Access Management should be controlled in-house although some have used managed services with this function.	○
Infrastructure Services	Server, Storage and Data Center services could be considered for managed services because there are many companies that provide outsourced infrastructure services successfully.	●
Network Services	Network services can be a good candidate for Managed Services: there are many options for support providers and other R1s have successfully used managed network services.	◕
Security Services	Security services require detailed knowledge of VT policies and security requirements that should be kept in-house. Certain sub-functions could use managed services (e.g., SOC, IAM, etc.).	◔
Support Services	End-user support services could be a good candidate for managed services based on successful case studies at other Higher Ed institutions.	◕
Telecom	Telecom services can be a managed service because the services are consistent across the University and should not require special knowledge or frequent architectural changes.	●
Training	Training services require VT domain knowledge that make it so they are not good candidates for managed services.	◔
Web Services	Web Services are not good candidates because they require VT domain knowledge.	○

● Strong candidate for Managed Services
◕ Candidate for Managed Services
◑ Potential candidate for Managed Services
◔ Partial or weak candidate for Managed Services
○ Not a candidate for Managed Services

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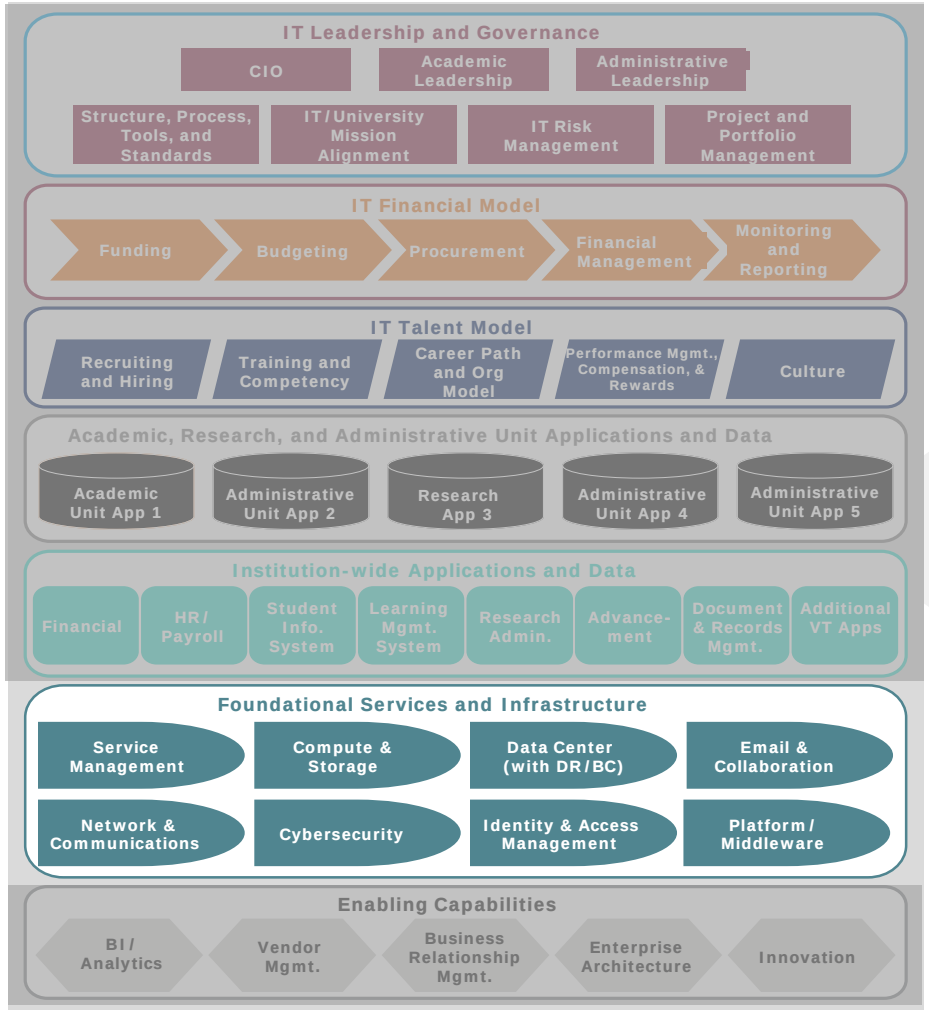
IT Service Management

Service Management Recommendations

Mature IT Service Management processes and tools will allow Virginia Tech to manage costs and deliver consistent, transparent services that meet the needs of its customers.



5.1 Implement University-wide CMDB processes and tools

- Establishes a critical and foundational element for business service delivery and asset management, providing the transparency and accountability needed to reduce risk, increase visibility, manage costs, and enable capacity planning.

5.2 Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience

- Standardizes best practices, reduces processing time, and improves customer satisfaction.

5.1 Implement University-wide CMDB[1] processes and tools

Accurate information on the physical and logical configuration of infrastructure and applications provides the transparency and accountability to reduce risk, increase visibility, manage costs, and enable capacity planning.

Problem Statement / Current State

- Asset and configuration information resides in various systems across the University.
- A formal process or repository for Asset and Configuration Items does not exist at the University-wide level.
- Basic configuration items (CI) exist in ServiceNow with no formal definitions or types documented.
- Asset data collection is inconsistent due to lack of formal process, resulting in poor integrity and accuracy.
- No documented relationships between IT infrastructure and services are in place in terms of configuration management requirements.

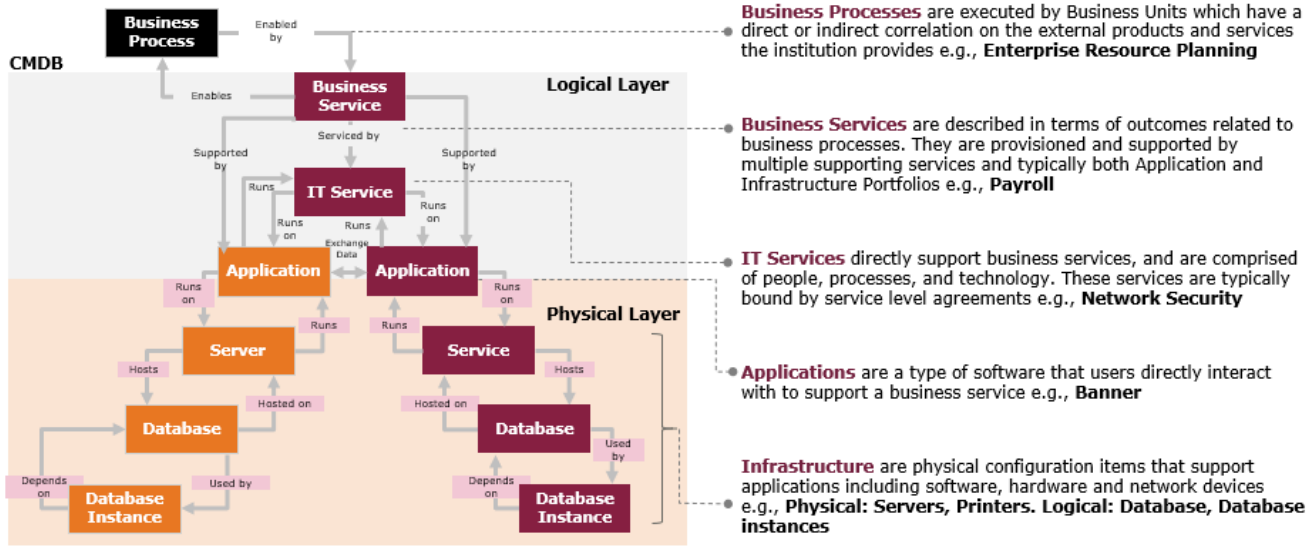
Summary Description

- Adopt a consistent and standard logical mapping methodology for defining all Services, Applications, and other physical CI layers.
- Work with distributed units to establish a single University-wide level configuration management process.
- All configuration information should be maintained in a centralized repository so that this information can be available to any processes including IM, CM, and PM in real time.
- The implementation process should incorporate periodic review and validation of configuration items, attributes, and relationship requirements.

Expected Benefits

- Establishes a critical and foundational element for business service delivery and asset management.
- Improves effectiveness of services by tracking availability and performance of logical and physical configuration items.
- Enables integration of core ITSM[2] processes (IM[3], PM[4], and CM[5]).
- Enhances reporting capabilities to increase transparency and make management decisions.

Conceptual Model



Business Processes are executed by Business Units which have a direct or indirect correlation on the external products and services the institution provides e.g., **Enterprise Resource Planning**

Business Services are described in terms of outcomes related to business processes. They are provisioned and supported by multiple supporting services and typically both Application and Infrastructure Portfolios e.g., **Payroll**

IT Services directly support business services, and are comprised of people, processes, and technology. These services are typically bound by service level agreements e.g., **Network Security**

Applications are a type of software that users directly interact with to support a business service e.g., **Banner**

Infrastructure are physical configuration items that support applications including software, hardware and network devices e.g., **Physical: Servers, Printers. Logical: Database, Database instances**

[1] CMDB – Configuration Management Database
[2] ITSM – IT Service Management
[3] IM – Incident Management
[4] PM – Problem Management
[5] CM – Change Management

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5.1 Implement University-wide CMDB processes and tools

Accurate information on the physical and logical configuration of infrastructure and applications provides the transparency and accountability to reduce risk, increase visibility, manage costs, and enable capacity planning.

Implementation Activities

- Establish policies and controls to mandate scope, quality, ownership of CI data across the University.
- Define responsibility and accountability matrix to crystallize roles and ownership structure.
- Align Service Performance, CI quality, and SLAs to annual performance evaluations.
- Define standards and taxonomy for each configuration item (CI).
- Conduct critical application and dependency analysis to prioritize approach.
- Complete data architecture mapping to identify risks to data accuracy and reliability.
- Identify target state requirements and evaluate CMDB tools, including discovery tools.
- Establish a “Golden Source” design mandate to drive all CIs to a single and common source of record.
- Implement CI Discovery and Service Mapping to validate configuration and identify discrepancies.
- Design prototyping of reporting / dashboards to confirm the right data will be available by design.
- Conduct comprehensive training for IT staff on new system and processes to facilitate change management.

Success Metrics

- % of services mapped to CIs
- % of applicable IT Units’ hardware and software represented in CMDB

Implementation Timeline

0 – 9 months | 10 – 18 months | 19 – 36 months

Level of Effort

Low | Medium | High

- **Data Gathering:** 1 FTE to work with each of the IT units for 1-2 months
- **Develop Standards and Taxonomy:** 1-2 FTE for 2-3 months
- **Determine Tool or Technology Support for Configuration Management:** 1 FTE for 2 months
- **Process and Procedures:** 1 FTE for 1-2 months
- **Strategy Implementation:** 1 FTE for 6-8 months
- **Staff Training:** 1 FTE for 1 month

Risks / Dependencies

Low | Medium | High

- Establishing IT governance, architecture, and a technology roadmap prior can help drive standards to which system objectives can be aligned (see recommendation 1.2).
- Internal buy-in from affected stakeholders and DoIT leadership is required to drive adoption to the planned strategy and approach.
- Creation, update & retirement of CIs should be carried out through two channels: a service request or a change request, both providing traceability and approval accountability.
- The data in the CMDB should accurately reflect the current infrastructure status.

Assumptions

- End user training and change management will be provided to all possible managers and IT staff.
- Talent resources exist dedicated to configuration management (partial or full time) to enable this initiative.
- Any implementation activities will work in conjunction with active ServiceNow governance groups, initiatives to broaden platform adoption, and any CMDB considerations.

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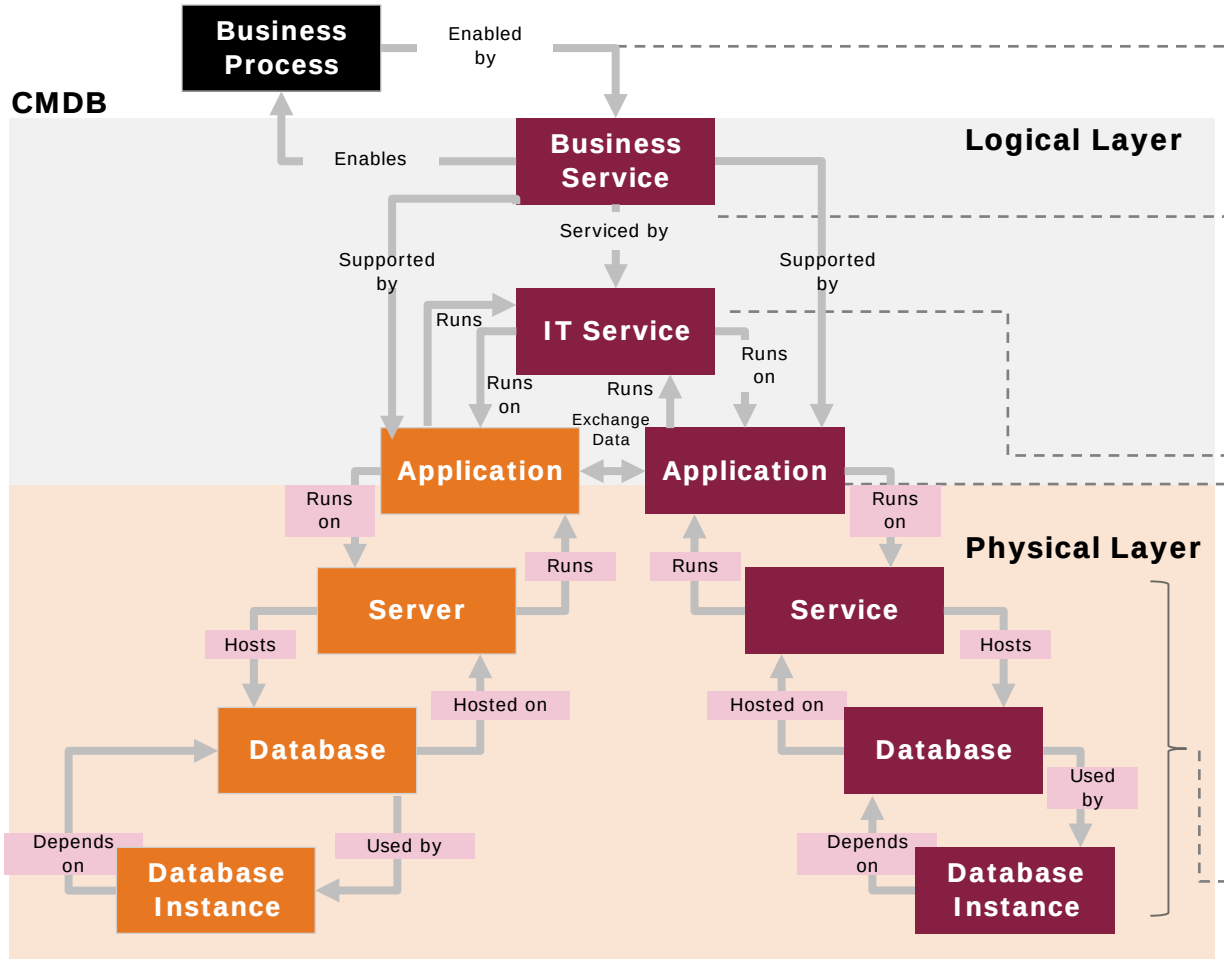
5.1 Implement University-wide CMDB processes and tools

The following illustrative CMDB Hierarchy Model is an amalgamation of a logical layer and a physical layer. The model is helpful in defining various layers of classification within a CMDB.

Conceptual CMDB Hierarchy Model



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Illustrative

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5.1 Implement University-wide CMDB processes and tools

The CMDB provides the necessary information for ITSM processes to perform more effectively.

ITSM Process	How the CMDB Enables the Process
Configuration Management *Captures CI attributes and relationships that are relevant for support of CIs during incidents, problems, and changes.*	▪ Gathers basic Configuration Item (CI) information ▪ Business Impact Analysis ▪ App-app and App-server relationships identified ▪ CI classes with standard information collected ▪ Automated Discovery and Service Mapping ▪ End-to-end technology stack mapped
Change Management *Relationships and potential impacts between CIs is known in order to assess risk more effectively.*	▪ CI risk assessment ▪ Business Impact Analysis ▪ Change blackout windows ▪ Related CIs and potential collisions ▪ Comprehensive Risk scoring (with all associated CIs)
Knowledge Management *Knowledge about supporting CIs is known and can be linked.*	▪ Knowledge entries associated to CIs ▪ Troubleshooting steps for CIs and common issues
Incident Management *CI information is more readily available thereby reducing resolution time.*	▪ Business Impact Analysis (to assess urgency) ▪ CI incident association and tracking ▪ Associated knowledge and diagnostics based on the CI ▪ Incidents associated with the CI
Problem Management *Information relevant to trending and root cause analysis can be used to identify true root causes, determine workarounds, and permanently solve problems.*	▪ CI for which a problem is being investigated ▪ Associated knowledge and diagnostics based on the CI ▪ Incidents associated with the CI ▪ Problem records and changes associated with CIs

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5.2 Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience

Maturing ITSM processes to standardize best practices, reduce processing time, and improve customer satisfaction increases effectiveness and efficiency of the organization.

Problem Statement / Current State

- Formal process documentation is lacking throughout core ITSM processes, with some areas more mature than others, leading to inconsistent service delivery.
- Service metrics are not reported consistently across ITSM processes, making it difficult to identify service improvement opportunities.
- Service Operation processes Event and Availability Management are reactive and lack maturity, creating a service impact to customers when issues arise.

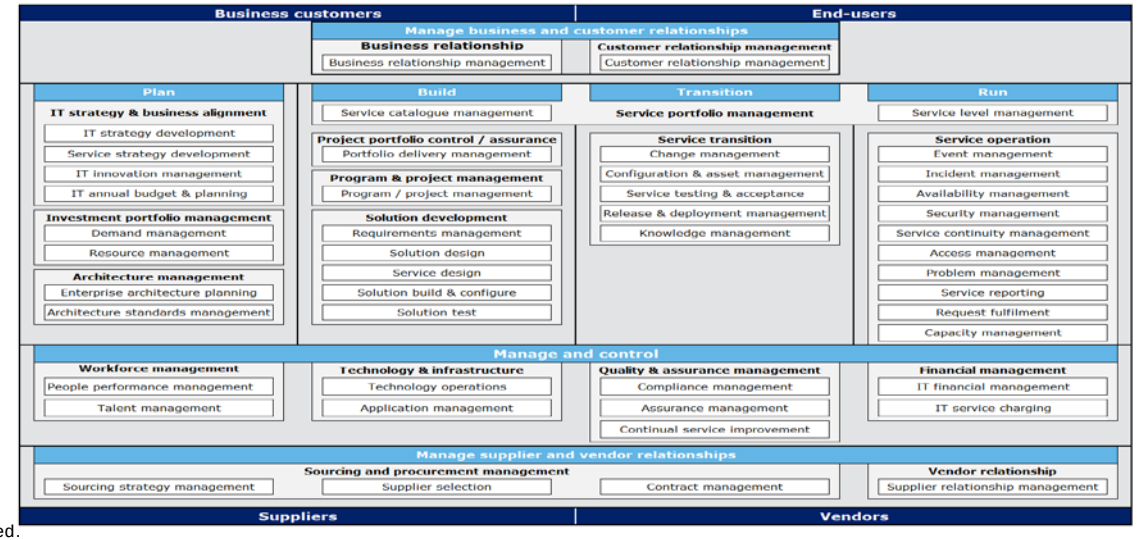
Summary Description

- Establish ITSM community of practice (CoP) between DoIT and distributed IT groups to develop and share best in class ITSM processes and tools.
- Define scope and Process Owner for each service management process
- Perform fit/gap analysis of standard processes.
- Document “to be” processes, roles and responsibilities and gather requirements for KPIs.
- Implement processes.
- Measure success of ITSM processes.

Expected Benefits

- Provides a consistent level of service across the VT landscape through collaboration and sharing of best-practices between the Division of IT and distributed IT Units.
- Improves user efficiency by providing a consistent framework for requesting services; reduces manual request processing and time delays, while providing transparency into status of requests.
- Improves effectiveness by defining how support teams collaborate to handle issues and manage IT changes with discipline, thus reducing errors.

Conceptual Model



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5.2 Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience

Maturing ITSM processes to standardize best practices, reduce processing time, and improve customer satisfaction increases effectiveness and efficiency of the organization.

Implementation Activities

- Establish ITSM community of practice (CoP) between DoIT and distributed IT groups to develop and share best in class ITSM processes and tools.
- Select key ITSM processes with the greatest impact to focus on developing and implementing.
- Define scope and Process Owner for each service management process.
- Document “to be” processes, roles and responsibilities; gather requirements for key use cases and scenarios; develop Key Performance Indicators (KPIs).
- Recommend organization development, skill and training needs to close any identified gaps between current state and “to be”.
- Where lacking, establish or expand SLAs and OLAs to include services.
- Consider incorporating a business relationship management (BRM) function where needed based on campus footprint; develop formal customer engagement processes and organizational structures to promote effective relationship management.

Success Metrics

- Number of incidents resolved with SLA as a % of total incidents
- % availability of critical applications

Implementation Timeline

0 – 9 months | **10 – 18 months** | 19 – 36 months

Level of Effort

Low | **Medium** | High

- **Needs fit/gap:** 2 IT Service Management FTEs for 2 months
- **Process requirements and metrics design:** 2 IT Service Management FTEs for 2 months
- **Catalog and portal design and development:** 3.5 FTE’s, plus 2-4 part-time unit IT participants for 2 months
- **Validation and implementing:** 2 IT Service Management FTEs, 0.5 Business Strategy & Applications FTE, 0.5 Infrastructure Services FTEs and 0.5 Security FTEs for 12 months total duration

Risks/Dependencies

Low | **Medium** | High

- Governance process must establish accountable service owners and policies to plan and maintain the IT service portfolio, including introduction and retirement of services (see recommendation 1.1).
- The automated workflows for request fulfillment depend on alignment on a standard IT service management system.
- Developing appropriate frequency of communications will be a critical success factor.

Assumptions

- All IT service processes will be tracked on a standard system.
- Processes will operate across boundaries, requiring collaboration among DoIT and college/unit IT teams as well as designated functional roles (such as Approvers).
- Any implementation activities will work in conjunction with active ServiceNow governance groups, initiatives to broaden platform adoption, and improve ITSM practices.

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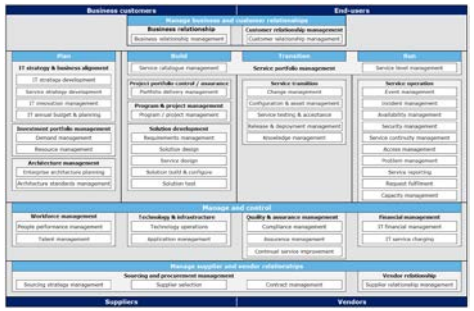
5.2 Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience

The following approach was used to filter the processes listed in the framework down to a manageable number.

Filter Approach

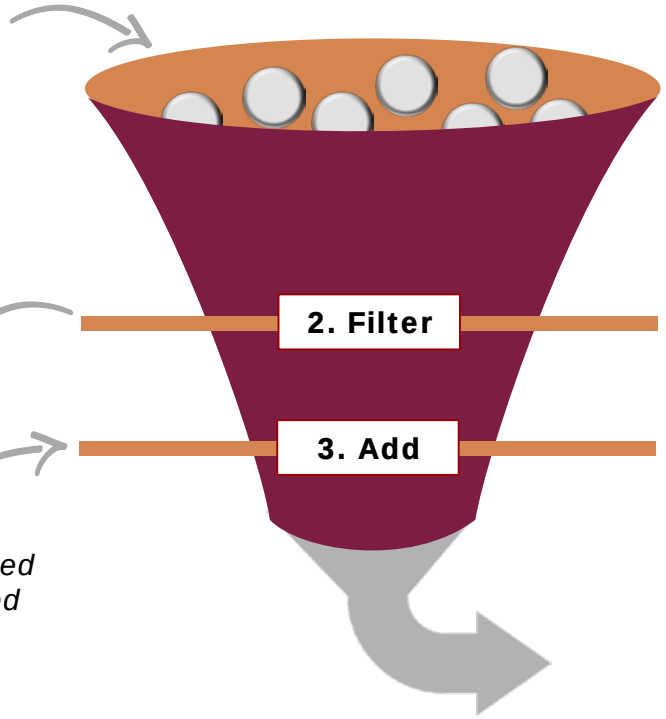
1. Start with the ITIL Framework



47 *Initial Areas*

2. Filter by "Run" domain

Although improvements can be made throughout the IT Service Management model, those within the "run" domain are the most impactful to the end-user.



36 *Non-Run and* ***1*** *Run related process areas currently meeting needs are removed.*

5 *Non-Run related processes added back.*

3. Add back key processes

Some processes outside of "Run" will be needed to support ongoing initiatives.

Result in 15 Processes

- *Incident Management (run)*
- *Problem Management (run)*
- *Request Fulfillment (run)*
- *Service Continuity (run)*
- *Service Level Mgmt. (run)*
- *Service Reporting (run)*
- *Event and Alert Management (run)*
- *Access Management (run)*
- *Availability Management (run)*
- *Capacity Management (run)*
- *Change Management (transition)*
- *Release & Deployment (transition)*
- *Asset and Configuration (transition)*
- *Service Catalog Management (build)*
- *Business Relationship Mgmt. (customer)*

5.2 Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience

Each process was given a target maturity based on future state recommendations and input from stakeholders interviewed.

Process	Target State	0	1	2	3	4	5
Incident Management	Comprehensive SLAs exist and all incidents are proactively tracked and escalated to confirm that the agreements are met. Incident resolution tools are in place such as comprehensive Knowledge Base and Self help. Incident Management is structured to best meet the requirements of the business.			◆	◆		
Problem Management	A dedicated Problem Management team exists that is responsible for proactive problem determination and resolution. Problems are classified for category, urgency, priority and impact and assigned for investigation. Problem Management conducts both resolution of recurring Incidents and also proactive Problem Management.		◆		◆		
Request Fulfillment	Request Fulfillment provides standardized services, which result in measured high quality service. Services are commoditized and well managed, ensuring complete control over licensing, media, and IT infrastructure. Users can access information and services easily, and satisfaction results and metrics indicate wide-spread usage. Technology is used to assist in providing Request Fulfillment services - such as self-help portals.			◆	◆		
Service Continuity Management	A comprehensive Continuity Strategy has been developed and agreed with the business. Recovery plans are developed, tested, and maintained regularly with individuals trained and aware of their responsibilities in the recovery plans. IT Service Continuity Management (ITSCM) is closely interfaced with other processes such as Change, Configuration, Capacity, and Availability Management to confirm ITSCM plans and actions stay current.		◆		◆		
Service Level Management	Comprehensive Service definitions and Service Level Agreements (SLAs) are in place covering all required Services delivered to the business. SLAs are supported by formal OLAs between units and UCs with suppliers, which provide the required end-to-end service target levels. Service Levels and supporting agreements are subject to regular formal review and are updated and refreshed as appropriate. Service Level Management (SLM) verifies that service level targets are being monitored and achieved, and takes corrective action if targets are missed. SLM roles and responsibilities are defined and suitably trained resources are assigned to roles.			◆	◆		
Service Reporting	IT measures and reports end-to-end service performance against the Availability, Reliability, and Performance of delivered Services. Service Measures are recorded for all key measures of performance. Measurements are accurate, reliable, specific, clear, and useful. Service Measurement uses appropriate technologies to automate measurement, correlation, and analysis.		◆		◆		
Event & Alert Management	Active Event monitoring tools are in place to poll key CIs to determine their status and availability. All exceptions are reported the appropriate tool or team for action. Events are correlated to provide sophisticated categorization and escalation based on combined event impact.		◆		◆		
Access Management	Comprehensive Access Management processes are defined covering: Requesting access, Verification, Providing Rights, Monitoring Identity Status, Logging and Tracking Access, Removing and Restricting Access. User accounts are grouped into roles/job types to assist in efficiently granting appropriate access. Employees are granted the right-level of access which they require to effectively execute their role.			◆	◆		

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◆ Current Maturity Level ◆ Suggested Target Maturity Level

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5.2 Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience

Each process was given a target maturity based on future state recommendations and input from stakeholders interviewed.

Process	Target State	0	1	2	3	4	5
Availability Management	Procedures for monitoring, analyzing, and forecasting service availability are defined and executed with a dedicated Availability team responsible for tracking and improving service availability. Effective technologies are used to support the Availability Management processes (including system monitoring, antivirus, firewalls etc.).		◆		◆		
Capacity Management	Proactive Capacity Management occurs whereby capacity levels are regularly checked and adjusted as appropriate. Appropriate technology is used which monitors available for hardware, software, networking & peripherals. A Capacity Management plan is documented and maintained. Capacity Management inputs into ITSCM Process.		◆		◆		
Change Management	Change Management defines Standard Normal and Emergency procedures for changes. Standard changes are clearly identified - such as in a Service Catalogue. Change Management provides a consistent and trusted approval mechanism for change. Changes are assessed for IT and Business impact and are fully vetted for completeness of planning/testing/roll back etc. Changes are presented to a change advisory board (CAB) for approval. A forward schedule of change is produced and updated.		◆		◆		
Release & Deployment	A clear and explicit Release & Deployment Management policy is defined and well communicated. Procedures exist to support the policy. Technologies are used to support the Release & Deployment Mgmt. process such as application sizing and testing, software 'wrapping', and deployment etc. A dedicated testing environment exists which accurately reflects the live environment.		◆		◆		
Asset & Configuration	Formal procedures and processes exist for identifying, categorizing, and recording Asset and Configuration information in a CMS and Integrated CMDB. Standard naming conventions are used and CIs are uniquely tagged with an identifier. Technology is used to support SACM - such as automated CI discovery and status tracking relationships between CIs are well understood, recorded, and updated by procedures.		◆		◆		
Service Catalog	All services delivered are defined and recorded consistently in the Service Catalog. Processes are documented and enforced to: Define the service, Produce and Maintain the Service Catalog, and Map Interfaces and Dependencies consistently between the Service Catalogue and Service Portfolio.			◆	◆		
Business Relationship Management	A dedicated BRM function exists to engage with academic, administrative, and research customers consistently. There is good alignment between IT and the business and their relationships are focused on planning and longer-term needs. IT works with academic, administrative, and research customers as partners to understand IT strategy, goals, etc.		◆		◆		

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◆ Current Maturity Level ◆ Suggested Target Maturity Level

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IT Transformation Case Studies

University of Kansas

University of Kansas (UK) is a large public R1 University with 28,000+ students.

Case for Change

Driven by a bold University-wide strategic plan, The University of Kansas's IT department was tasked with transforming its operations with goals centered around increased efficiencies, cost savings, and service delivery. The department was faced with a multitude of issues and inefficiencies, including:

- Decentralized, redundant, unorganized operations.
- A lack of transparency and outreach which limited collaboration.
- Disconnect with customers around service type and delivery.

Transformation

To help drive the transformation efforts, an assessment of the IT operations at Kansas was performed and identified the necessity to take on several key initiatives across two campuses. Over the course of the project, IT Leadership was tasked with:

- Centralizing University servers.
- Reorganizing and redefining IT staff and organization.
- Increasing the usage of multifunction devices for desktop printing.
- Implementing a single identity management system across all campuses.
- Optimizing network capabilities.
- Leveraging software purchasing agreements.

Impact

KU achieved multiple efficiencies while also improving service:

- More than 700 servers and 50 employees were added to the centralized IT operations.
- Service and customer satisfaction grew to an all-time high, with 97% of IT customers reporting happiness with the services being provided.
- IT has been consistently approached by individuals throughout the University looking to collaborate and partner on technology and non-technology related endeavors and much more proactively.
- Institutional Leadership have become more aware of the value that the IT department brings to the University.

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Private R1 University

Large West Coast University with 40,000+ students.

Case for Change

The University's central IT organization had challenges in multiple areas:

- Distrust by campus IT units as a service provider.
- Central IT lacked standardization across most of its IT talent management processes.
- Flat network architecture and design resulting in frequent outages.
- Asset inventory and lifecycle management was lacking across organization.
- No demand management or capacity planning procedures in place to plan for and forecast IT needs.
- Few ITSM processes existed and central IT did not report metrics or measure service level agreements to drive excellent service.

Transformation

Before embarking on any new enterprise-wide initiatives, the University:

- Adopted a new organizational structure that modernized functions and reporting lines to establish the foundation as a more "digital" organization
- Conducted a job classification study for IT staff, revised job titles and pay structures, and migrated staff into new roles, enabling more competitive pay, more defined roles and responsibilities, and a higher quality workforce equipped with in-demand market skills.
- Matured core ITSM processes that were foundational to delivering both common and new services and projects for the University.

Impact

The reorganization and focus on maturing central IT capabilities as a service provider served as a foundation for improved customer service and effectiveness:

- Implemented a network infrastructure transformation including upgrades to University data center, University-wide routing, network security, and network access in the 250+ buildings.
- Delivered two successful University-wide business transformation projects for finance and human resources enabled by ERP migrations to the cloud for HR and Finance.
- Expanded scope of services provide greater support for campus and individuals, including campus-wide Slack implementation and CRM capabilities.
- Recognized as a "go-to" employer for IT talent within the University.

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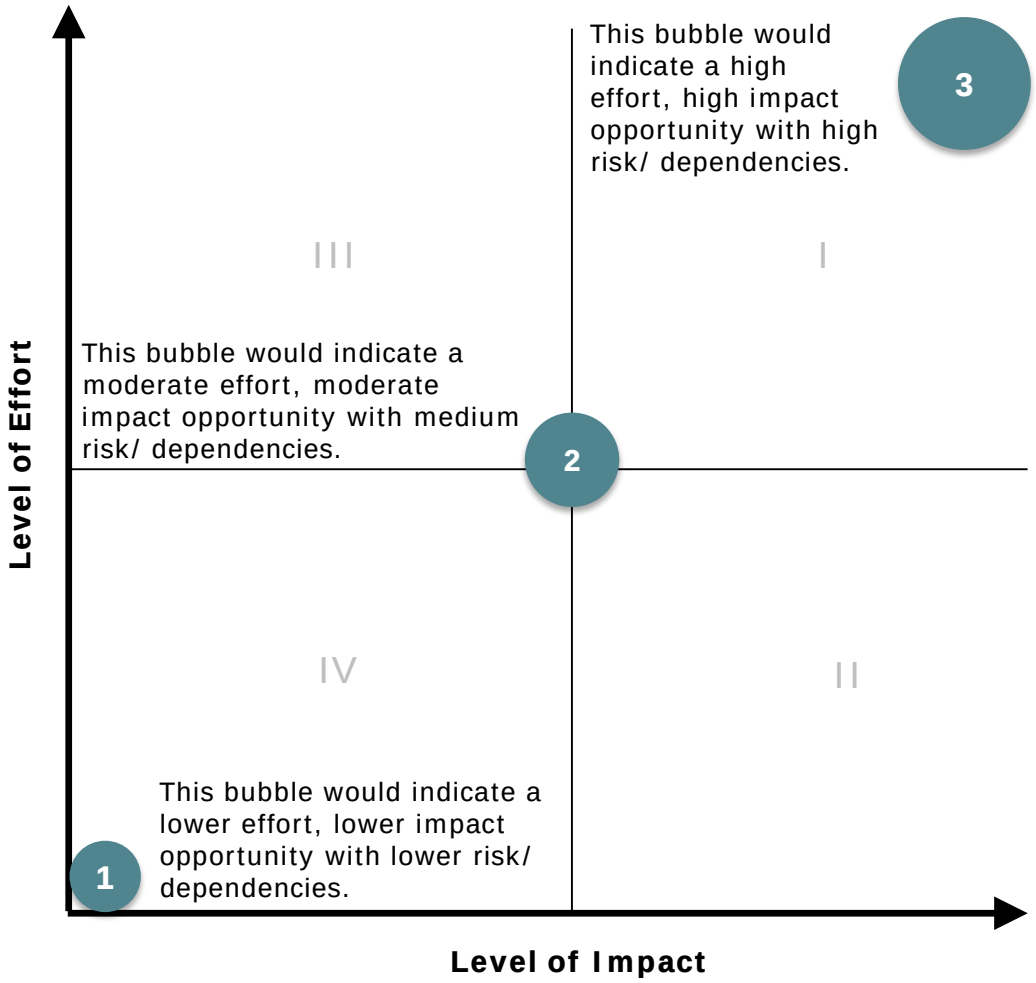
Implementation Roadmap

Prioritization and Timeline

IT Transformation Recommendations Map Key

Our estimates of the levels of effort, risk, and impact for each “Transformational” opportunity is based on interviews with Virginia Tech leaders and employees and past Deloitte experiences with similar transformations.



Effort

Lower Effort, indicates less cross-functional alignment needed, few FTEs needed, and/or fewer stakeholders to be engaged.

Moderate Effort, this could require significant amounts of work hours. dedicated management across areas, 2-3 FTEs needed, and/or multiple stakeholders need to be engaged.

High Effort, could require greater number of dedicated FTEs and senior leader buy-in potentially University-wide.

Low **Medium** **High**

Impact

Lower Impact, less stakeholders impacted, lower amount of change for those impacted, and/or risk/ efficiency/ effectiveness addressed.

Moderate Impact, could significantly change the way work is done for large number of people and/or risk/ efficiency/ effectiveness addressed.

High Impact, systematic change to the way things are done, affects large number of stakeholders, and/or significantly addresses risk/ efficiency/ effectiveness.

Low **Medium** **High**

Risk/ Dependencies

Lower Risk, in terms of financial, reputational or long-term strategy obtainment along with minimal dependencies and risk of maintaining status quo.

Moderate Risk, in terms of financial, reputational or long-term strategy obtainment along with moderate dependencies and risk of maintaining status quo.

High Risk, in terms of financial, reputational, or long-term strategy obtainment along with greater dependencies and risk of maintaining status quo.

Low **Medium** **High**

Note: Bubble Size Corresponds to Level of Risk/ Dependencies

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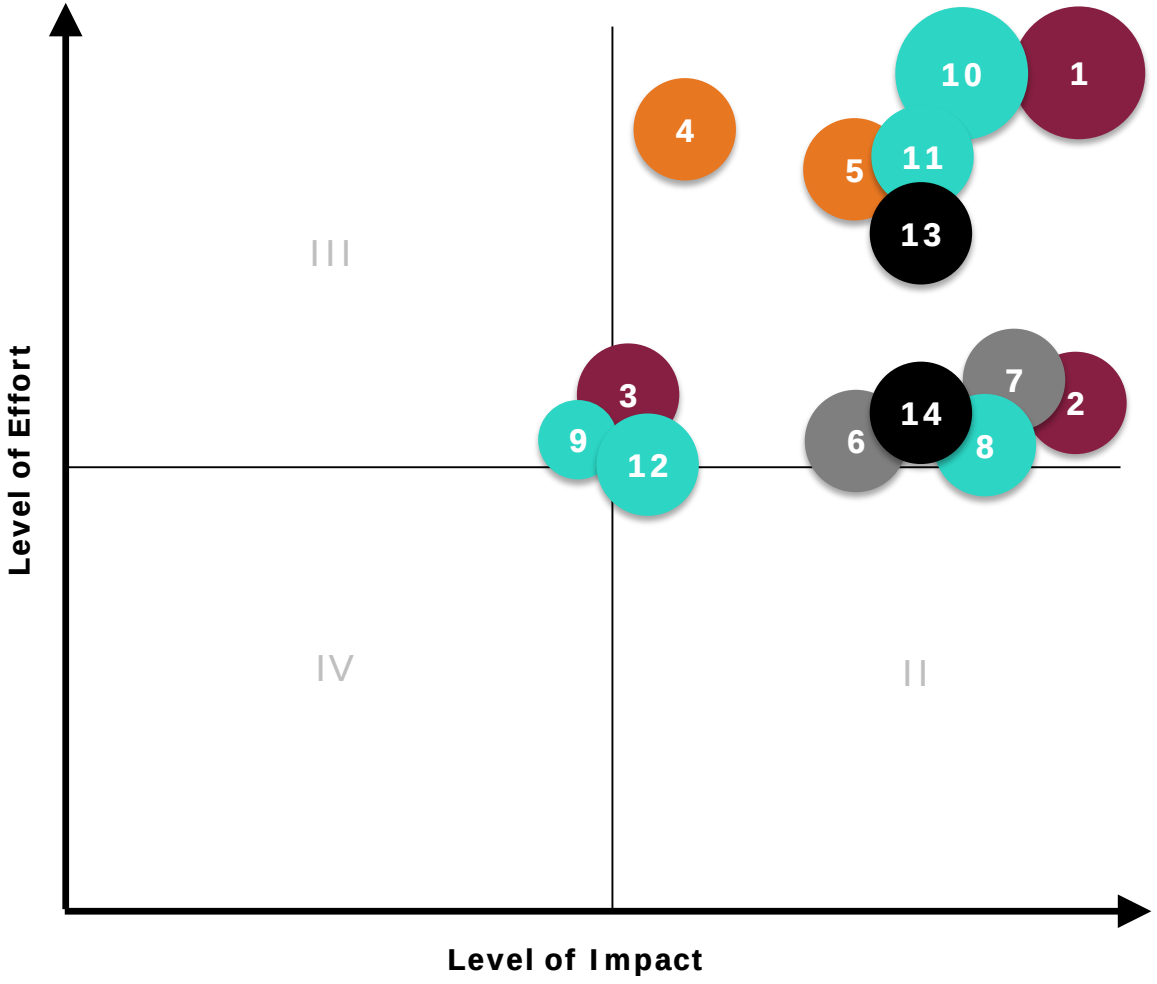
IT Transformation Recommendations Map

Our estimates of the levels of effort, risk, and impact for each “Transformational” opportunity is based on interviews with Virginia Tech leaders and employees and past Deloitte experiences with similar transformations.



Future State Recommendations

1. Define the University-wide IT Operating Model (1.1)
2. Establish a University-wide IT governance model (1.2)
3. Establish University-wide IT project management office and University-wide IT architecture functions (1.3)
4. Optimize Funding Model (2.1)
5. Streamline Software Procurement Process (2.2)
6. Revise DoIT’s Organizational Model (3.1)
7. Standardize IT Staff Job Classifications (3.2)
8. Enhance Data Governance (4.1)
9. Deploy a Common Integration Layer (4.2)
10. Rationalize Application Portfolio (4.3)
11. Establish Data Center Consolidation Strategy / Cloud Enhancement (4.4)
12. Define Strategy for Adopting Managed Services & SaaS Solutions (4.5)
13. Implement University-wide CMDB processes and tools (5.1)
14. Enhance Maturity of Core ITSM Processes (5.2)

Governance · Finance · Talent · Technology Capabilities · Service Management

Note: Bubble Size Corresponds to Level of Risk / Dependencies

*Note: Cybersecurity recommendations provided as a separate deliverable

High Level Implementation Plan

VT should realign the IT operating model and strengthen the foundation of IT services before rationalizing common administrative and academic services.

KEY IMPLEMENTATION PRIORITIES	Year 1*				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ENABLING ACTIVIITES												
0.0 Establish and Launch IT Transformation Program Management Office and Change Management Strategy												
GOVERNANCE												
1.1 Define the University-wide IT Operating Model to clarify roles and responsibilities for IT across VT.												
1.2 Establish a University-wide IT governance model to enable greater collaboration, transparency, and mission alignment.												
1.3 Establish University-wide IT project management office and IT enterprise architecture functions.												
FINANCE												
2.1 Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery.												
2.2 Streamline software procurement process to expedite acquisitions and improve the customer experience.												
TALENT												
3.1 Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities.												
3.2 Standardize job classifications to improve career pathing, training, and performance & compensation management.												
TECHNOLOGY CAPABILITIES												
4.1 Enhance Data Governance to enable greater access, reporting, quality, & clarification over data roles, responsibilities.												
4.2 Deploy a common integration layer to enhance data sharing across systems.												
4.3 Rationalize application portfolio across VT.												
4.4 Establish data center consolidation strategy and explore enhancing cloud capabilities.												
4.5 Define strategy for effectively adopting managed services and SaaS solutions.												
SERVICE MANAGEMENT												
5.1 Implement University-wide CMDB processes and tools.												
5.2 Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience.												

*Note: Timeline represents a calendar year with an assumed start date of Monday January 3rd, 2022

KEY: Implementation Timeline

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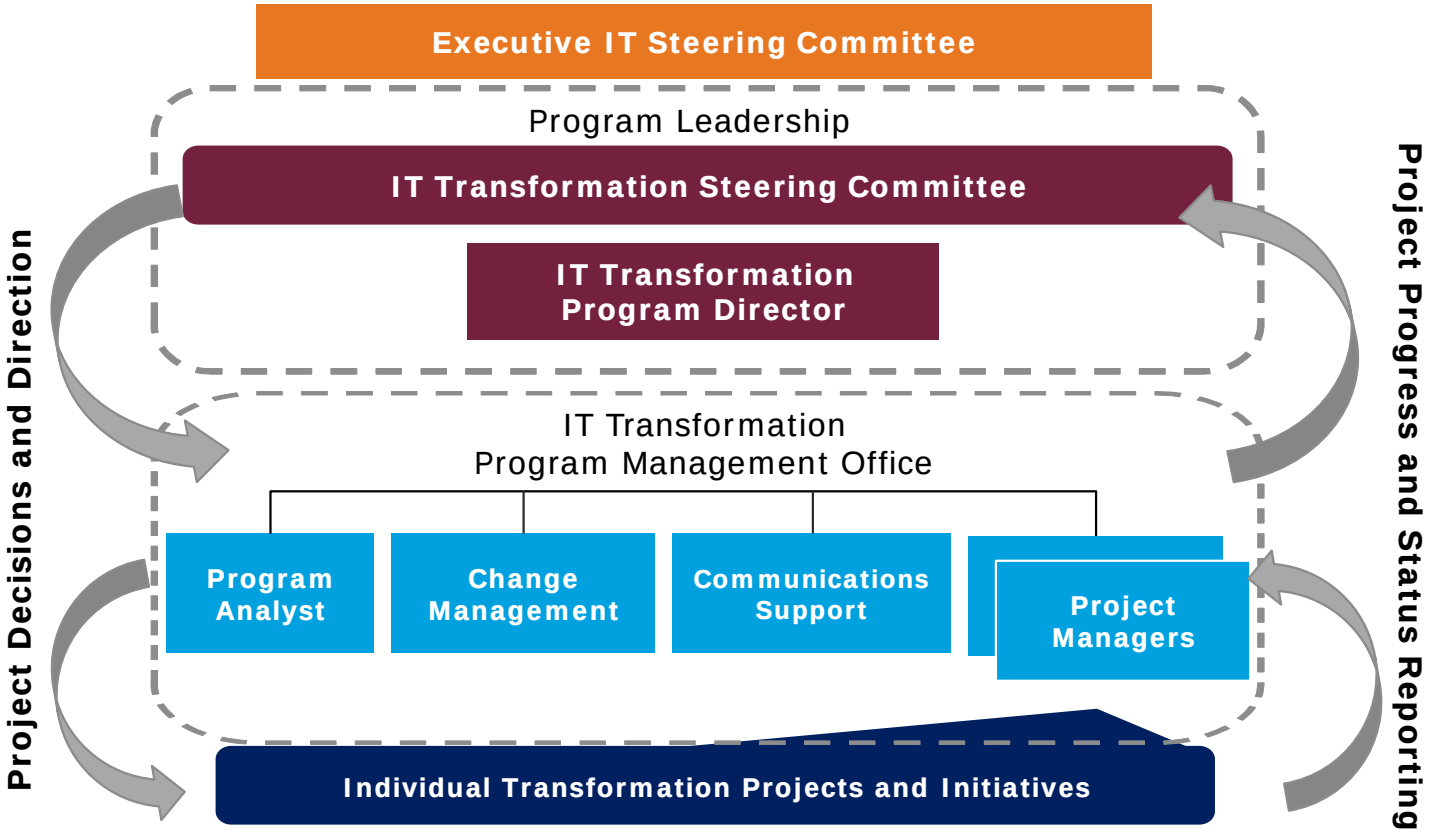
Program Management

Define the Program Management Approach

Prior to kicking off the Transformation Program, Virginia Tech should establish its approach to implementation. A proposed program management model used at similar institutions is outlined below.

Structure of University-wide IT Transformation Program Management Office



Staffed by full-time resources to support continuity of project management methodologies and skills.

Key Responsibilities

- Transformation cannot be completed ancillary to other duties. To get results and garner stakeholder support, it should be implemented programmatically with effective organizational supports.
- A first step is to set up the operating environment for the program:
  - Set up entails finalizing project management templates and documentation requirements.
  - Roles and responsibilities and reporting lines of the PMO.
  - Processes related to project initiation, delivery, and closeout/knowledge transfer.
- A formal kick-off of processes and activities should then be conducted.

Sample Charter – Executive IT Steering Committee

Establishing the proper ongoing governance structure through an Executive IT Steering Committee with a regular cadence of meetings will support ongoing change initiatives.

Objective and Scope	
Objective:	Oversee IT Transformation Steering Committee and IT Transformation Program Management Office, inclusive of setting University-wide IT strategy; reviewing transformation progress; decide on program projects; resolving escalated issues, risks, or decisions; establishing priorities for the Division of IT as a whole; allocating resources (FTE and funding); and advising on coordination with concurrent transformational initiatives at VT.
Scope:	The scope of oversight for the Executive IT Steering Committee includes oversight of both IT Transformation Steering Committee and IT Transformation Program Management Office for the duration of the transformation program, from program design to close

Key Responsibilities

Throughout the life of the program,

- Provide guidance and strategic direction to IT Transformation Steering committee.
- Provide context for individual academic, research, and administrative IT units as necessary.
- Meet regularly to review initiative details, progress, and to make decisions.
- Serve as program advocates and facilitate change management within each member's respective community.
- Leverage institution relationships to 1) build trust and credibility for the committee (the higher the level of trust, the greater the speed of execution), 2) transform resisters with focus not on whether to implement but on "how", and 3) change readiness.
- Timely decision-making where each project schedule is not impacted unfavorably.
- Advise on issues or decisions that should be escalated to the President

Sample Charter – Executive IT Steering Committee

Establishing the proper ongoing governance structure through an Executive IT Steering Committee with a regular cadence of meetings will support ongoing change initiatives.

Committee Members

- VT Provost
- VT Chief Business Officer
- VT Chief Information Officer

Member Expectations

- Take a strategic, VT-wide view of issues, inclusive of academic, research, and administrative perspectives IT Unit perspectives.
- Take ownership for the program objectives, direction, and attainment of outcomes.
- Champion decision outcomes.

Meeting Cadence

- Weekly to start

Decision Inputs and Outputs

Inputs – Items To Inform Decision Making:

- Change Request for program/project changes (scope, timeline, budget) above defined thresholds
- Program financial statement (Executive Summary)
- Change Management Strategy & Plan, including Stakeholder Engagement Plan
- Communication Strategy & Plan
- High level Master Project Plan
- Weekly status report with critical path risks identified including early thinking for mitigation strategies

Outputs – Items The Committee Will Decide On:

- Portfolio of transformation projects
- Additions/removals of projects to portfolio
- Project Roadmap (sequence and schedule)
- Program budget (includes project budget)
- Program scope (includes project scope)
- Mitigation strategies for Program risks and issues
- Program changes (scope, schedule, budget) above defined thresholds

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PMO Roles and Responsibilities

Within the PMO, resources should fulfill the following roles and responsibilities throughout the life of the Program.

Executive IT Steering Committee	• Oversees and makes decisions on University-wide IT strategy. • Decides on projects above certain thresholds. • Determines whether to grant exceptions from approved standards and exemptions from standard solutions. • Makes decisions on issues that cannot be resolved by the Transformation Steering Committee.
Transformation Steering Committee	• Provide guidance and strategic direction to transformation program. • Provide context for individual unit and college needs where necessary. • Meet regularly to review initiative details, progress, and make decisions. • Serve as program advocates and facilitate change management within each member's respective community. • Membership for the Transformation Steering Committee will include Unit IT Executive Leadership. • Upon establishment of the proposed Executive IT Steering Committee, governance of the IT Transformation program can shift to that group (assumes some members of Transformation Steering Committee will then also serve on Executive IT Steering Committee while others can serve as part of other formal governance groups).
Program Director	• Meet with the Transformation Steering Committee on a regular basis to discuss program status, progress against the transformation roadmap, upcoming needs and activities, and any escalated issues or risks. • Oversee, review, and approve transformation activities, work products, and metrics reporting. • Assist in meeting Virginia Tech as needs arise throughout the transformation effort.
Program Analyst	• Build and maintain project management and reporting templates, tools, and documentation. • Track status and progress across all transformation efforts against a master plan on a regular basis and compile findings into portfolio-level reports according to the established process, including consolidated measurement of the program's progress against established metrics. • Provide day-to-day PMO support, conducting tasks and activities as required to support the overall transformation effort.

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PMO Roles and Responsibilities (continued)

Within the PMO, resources should fulfill the following roles and responsibilities throughout the life of the Program.

Change Management	• Develop and implement strategies related to change management and culture throughout the life of the transformation program. • More detail on the contents/approaches to each of these strategies is contained in the “Change Management and Communications” section that follows.
Communications Support	• Conduct ongoing communications, outreach, and stakeholder engagement activities. • More detail on the contents/approaches to each of these strategies is contained in the “Change Management and Communications” section that follows.
Project Managers	• Assigned to manage one or multiple individual transformation initiatives on a full-time basis. • Report on status and metrics in accordance with the PMO standards and templates. • Work with initiative project teams to identify risks and issues, escalating as appropriate. • Identify and report on quick wins, milestone achievements, and other points of interest to the Virginia Tech community for communication.

Change Management and Communications

Key Change Management Considerations

Transforming the IT operating model at an organization the size of Virginia Tech requires careful attention to all dimensions of Change Management.

Dimension	Element	Key Considerations
Change Leadership	Culture	• Moving from a siloed environment to a more unified, customer-oriented organization will require significant culture change, which must be addressed during implementation.
	Stakeholder Engagement	• Internal and external stakeholder support are essential throughout the transformation process, making assessment and engagement of stakeholders critical.
	Change Readiness	• It will be important to know how ready the organization is for change, helping leaders preempt challenges and address concerns before challenges become problems.
Organization / Human Resources (HR)	Organization Structure	• Balancing new capabilities with current strengths can help with both effectiveness and change readiness.
	Workforce Transition	• The new model is only as strong as the workforce. Effective workforce transition requires effort but can speed up stabilization and reduce risk.
	Supporting HR Programs / Processes	• The new IT operating model will require a unified HR program to continue to align programs to strategies.
	Talent Management Programs / Processes	• The new IT operating model will require a comprehensive talent management program and associated human capital management processes.
Capabilities	Training and Learning	• An effective change management approach includes a strategy for training and learning that addresses both short-term needs and long-term employee development.
	Capability Transfer Plan / Processes	• If staff move into new roles within or across the IT units, an effective change management plan will support capability transfer to limit knowledge gaps.

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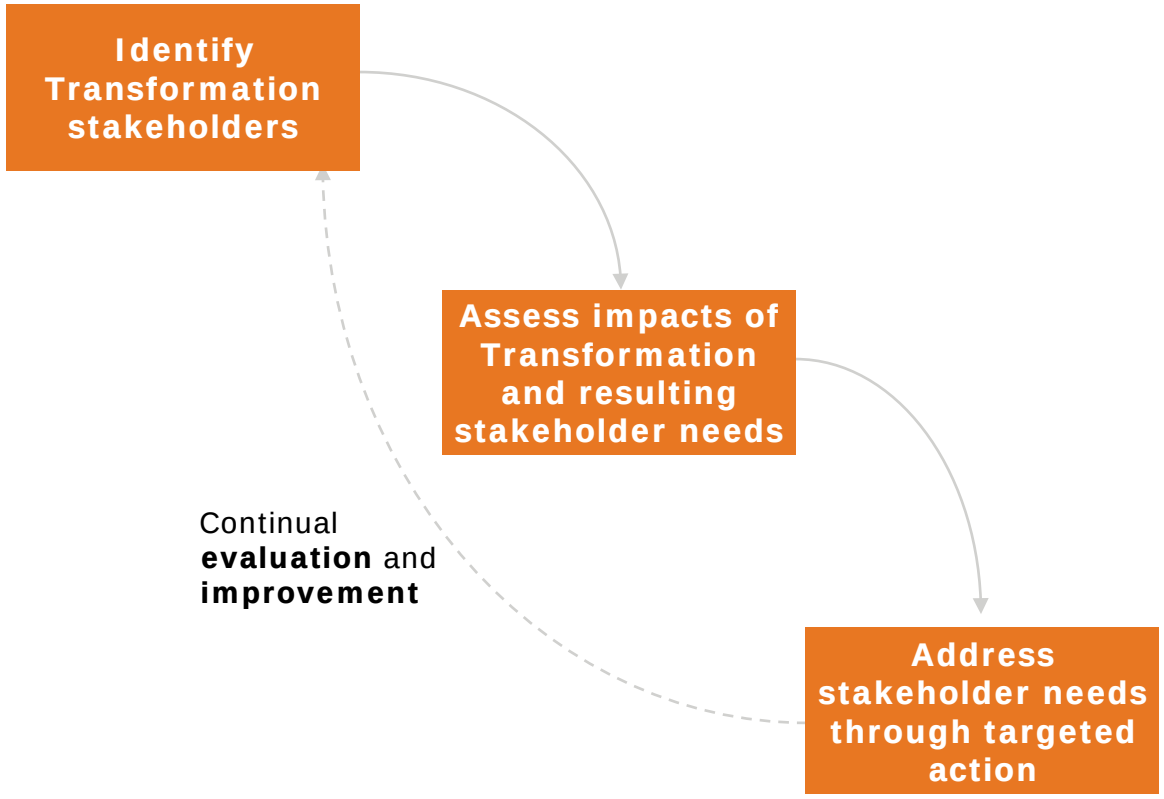
Develop Change Management Strategy

Developing a comprehensive Change Management Strategy, comprised of individual plans and processes by dimension, will enable a successful transformation program at Virginia Tech.

Change Management Strategy



Expected Benefits

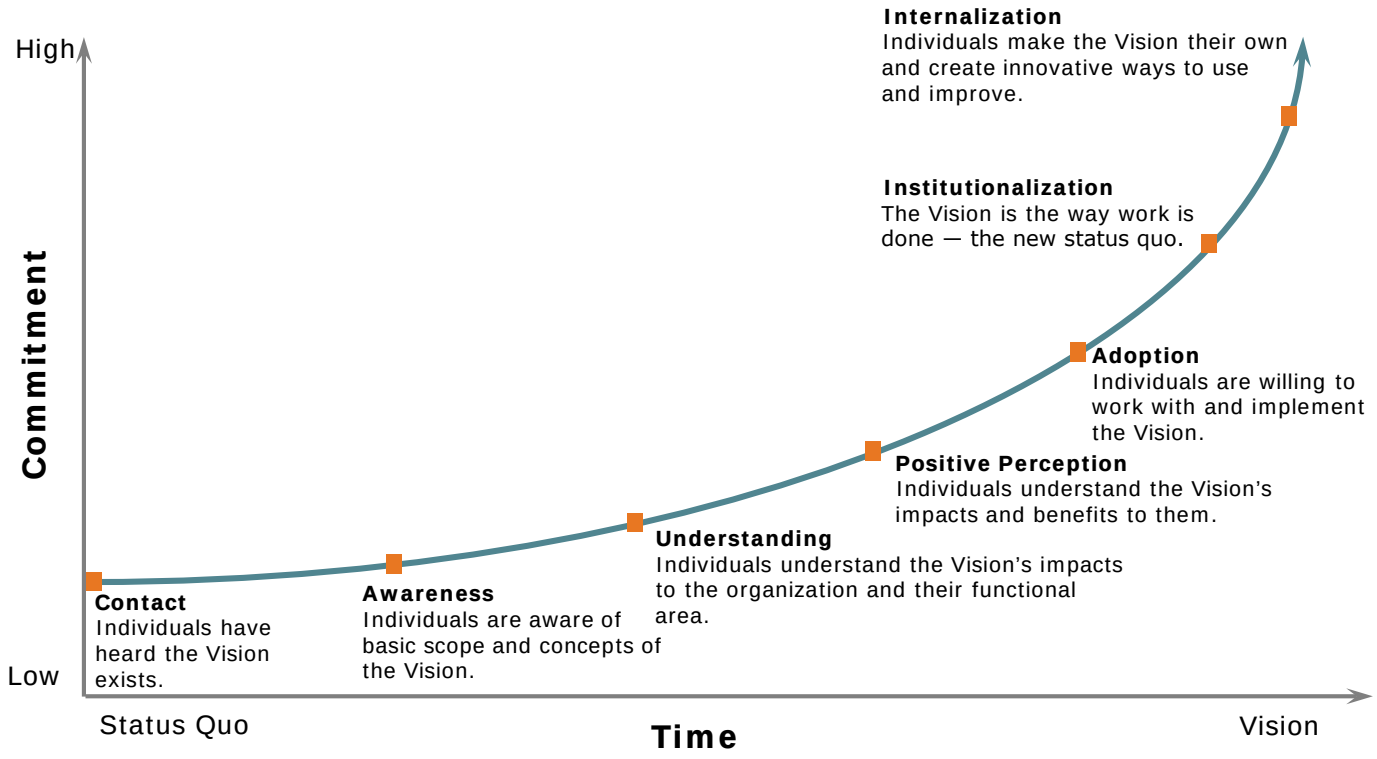
- Reduces the productivity gap that will occur as a result of changing how people do their jobs and leads to a less disruptive change window.
- Identifies current strengths in IT community, inclusive of community of practice and staff/faculty relationships, and leverages them to facilitate change.
- Reduces the risk of the transformation failing and requiring significant additional costs to “fix it” after the fact.
- Reduces the risk of employee turnover due to stress/anxiety around the change.
- Increases employee commitment to the change, resulting in increased engagement through making the initiative a success.
- Increases organizational effectiveness.
- Reduces the likelihood of a disruption to the customer experience or negative press.

Focus on Stakeholder Engagement

Virginia Tech will need to identify, assess, and engage a range of stakeholders to move from uncertainty to commitment, all of whom will be impacted by the transition in different ways.

Transformation Stakeholders

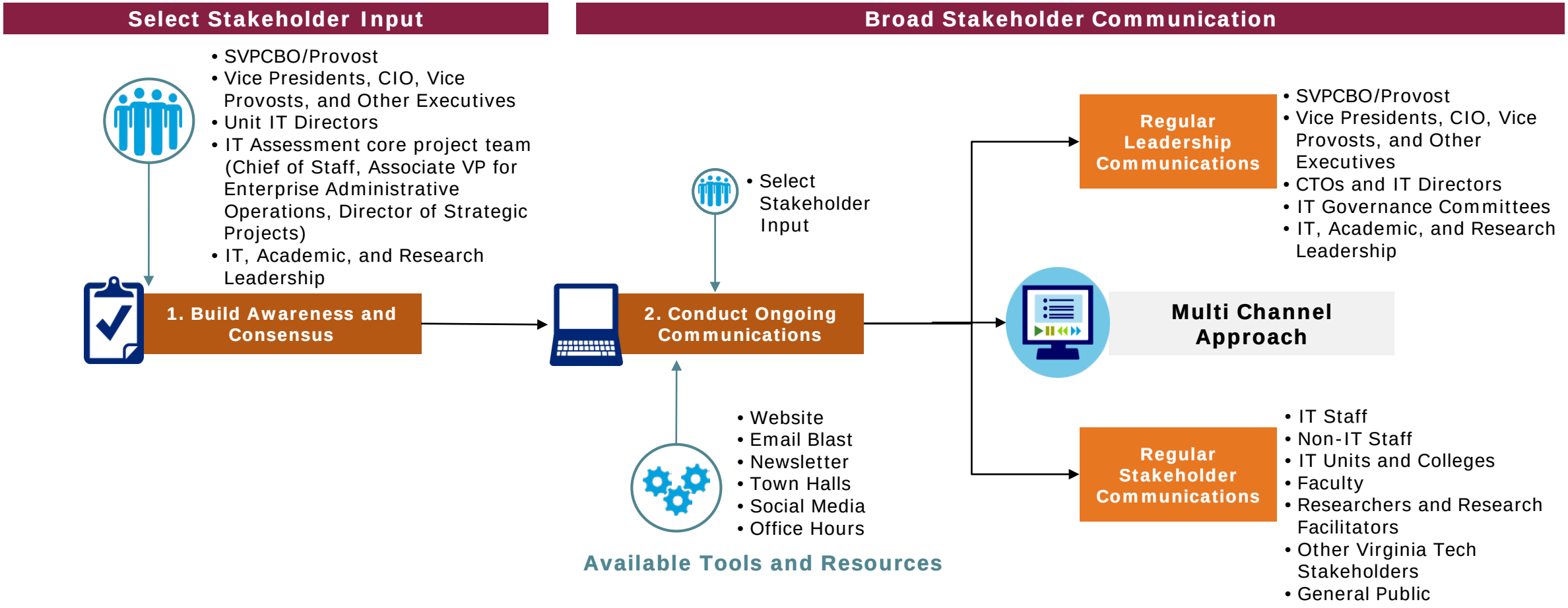
- Executive Leaders (SVPCBO, Provost, VPs, CIO, etc.)
- Academic Leaders (College Deans, Departmental/Unit Chairs, etc.)
- Administrative Leaders (Unit IT Executives, Directors, Unit IT managers, etc.)
- Faculty
- Researchers and Research Facilitators
- IT Staff
- Non-IT Staff
- Existing Students
- Prospective Students
- Vendors and Suppliers
- The Virginia Tech Community



Communicating a clear change imperative and providing visible and consistent leadership involvement will help guide stakeholders through the process.

Communication Approach

A two-phased communication approach is recommended; some communication has already begun in terms of the stakeholders engaged and awareness built throughout the IT Assessment project.



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Communication Plan Output Details

Based on the approach described, the following communication details are provided by phase.

	1. Build Awareness and Consensus	2. Conduct On-Going Communication
Who	• President • SVPCBO/Provost • Vice Presidents, CIO, VP of Finance, Vice Provosts, and Other Executives • Unit IT Executives and IT Directors • IT Assessment core project team (Chief of Staff, Associate VP for Enterprise Administrative Operations, Director of Strategic Projects) • IT, Academic, and Research Leadership	• IT Assessment Stakeholder Groups • IT Staff • Units and colleges across the University • Faculty • Other Virginia Tech Stakeholders/General Public
What	• Achieve support and feedback for transformation guiding principles and recommendations, while laying the foundation for Virginia Tech's strategic IT vision.	• Obtain support of and participation in the transformation program • Communicate transformation program objectives, activities, lessons learned, and opportunities.
When	• Immediately and through transformation program set-up.	• Throughout the life of the transformation program.
Where	• In-person individual meetings • Group working meetings • Project briefings and reports • Website	• Existing University community meetings • Social Media • Town halls • Newsletter • Email blast • Office Hours
Why	• To build consensus around IT Assessment objectives, deliverables, and transformation roadmap. • To update other key stakeholders on impacts and changes as they occur. • To build executive buy-in and ownership. • To provide consistent public information.	• To build support and engagement with initiatives and results from implementation onward. • To create a culture of transparency and collaboration. • To highlight efficiencies and leading practices in order to build University and public support.
How	• Tight coordination with the Provost, Deans, unit IT (e.g. institutes) and college-level IT, and executive leaders, and unit and college leaders to understand the needs of various stakeholders.	• A robust, formal, and centrally-managed communication program.

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Metrics Tracking

Benefits Tracking…Why do it?

Implementing a benefits tracking program is an important element to a transformation program, as it allows program leaders to track and demonstrate results.

Objectives

- **To create a benefits tracking process** that will help collect, measure, monitor, and communicate outcomes of transformation.
- **To incorporate continuous improvement** mechanisms for initial stages of the program and beyond.

Guiding Principles

- Focus on **outcomes that matter** (both measurable and anecdotal).
- Establish **accountability within each project.**
- Keep it **straightforward and 'implementable'.**
- Apply a **phased approach** (Pilot, then small and manageable rollout Year 1, then build upon in future years).

Lessons Learned

This is Hard Work

- Benefits tracking is complicated
- The current process is manually intensive because of a lack of data available and automated tools for generating metrics.

Avoid Comparing Apples to Oranges

- Differences in sophistication in colleges and units make gathering consistent data a challenge.
- Creating a consistent understanding among participants is essential.

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Metrics Summary

VT can measure implementation progress against expected benefits by using a set of Key Performance Indicators.*

Key Governance Metrics			
1.1	**Define the University-wide IT Operating Model to clarify roles and responsibilities for IT across VT.**	• Reduction in number of duplicative services across the University	• Increased adoption of Center for Internet Security (CIS) safeguards
1.2	**Establish a University-wide IT governance model to enable greater collaboration.**	• Establishment of a unified IT Strategic Plan • # of University-wide IT standards developed	• # of VT leaders engaged in strategic planning process (IT and Non-IT)
1.3	**Establish University-wide IT project management office and IT enterprise architecture functions with defined tools and methods.**	• % reduction in number of application platforms	• % of University-wide IT projects delivered on time, in scope, and on budget
Key Finance Metrics			
2.1	**Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery**	• % decrease of DoIT funding from recharge	• % distributed unit and college operating budget spend on DoIT-provided services
2.2	**Streamline software procurement process to expedite acquisitions and improve the customer experience.**	• # of outstanding procurement requests in IT PALS/ legal / security review	• Reduction in average time to complete procurement review
Key Talent Metrics			
3.1	**Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities.**	• % of staff transitioned into the new organization	• Reduction in number of duplicative services across the University
3.2	**Standardize job classifications for IT staff across VT to improve training, career development, and performance management.**	• # of unique job titles at VT • % of staffing job compensation within aligned market thresholds	• # of staffing ratios by function in alignment with industry benchmarks

*Proposed metrics only; actual metrics should be finalized by VT leadership

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Metrics Summary (continued)

VT can measure implementation progress against expected benefits by using a set of Key Performance Indicators.*

Key Technology Metrics			
4.1	Enhance Data Governance to enable greater access, reporting, quality, and clarification over data roles and responsibilities.	• % reduction in use of alternative BI tools across the University	• % increase of data stored in central data warehouse
4.2	Deploy a common integration layer to enhance data sharing across systems.	• Reduction in deployment time for new products • # of middleware integration tools being utilized across the University	• % of middleware integration layers being utilized across VT
4.3	Rationalize application portfolio across VT.	• Reduction in redundant license purchase costs	• Reduced proportion of custom vs. COTS/SaaS applications
4.4	Establish data center consolidation strategy and explore enhancing cloud capabilities.	• % of applications where cloud hosting was evaluated	• # of data centers across VT
4.5	Define strategy for effectively adopting managed services and SaaS solutions.	• # of services delivered by the managed services provider	• % increase of service level compliance for services provided

Key IT Service Management Metrics			
5.1	Implement University-wide CMDB processes and tools.	• % of services mapped to CIs	• % of applicable IT Units' hardware and software represented in CMDB
5.2	Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience.	• Number of incidents resolved with SLA as a % of total incidents	• % availability of critical applications

*Proposed metrics only; actual metrics should be finalized by VT leadership

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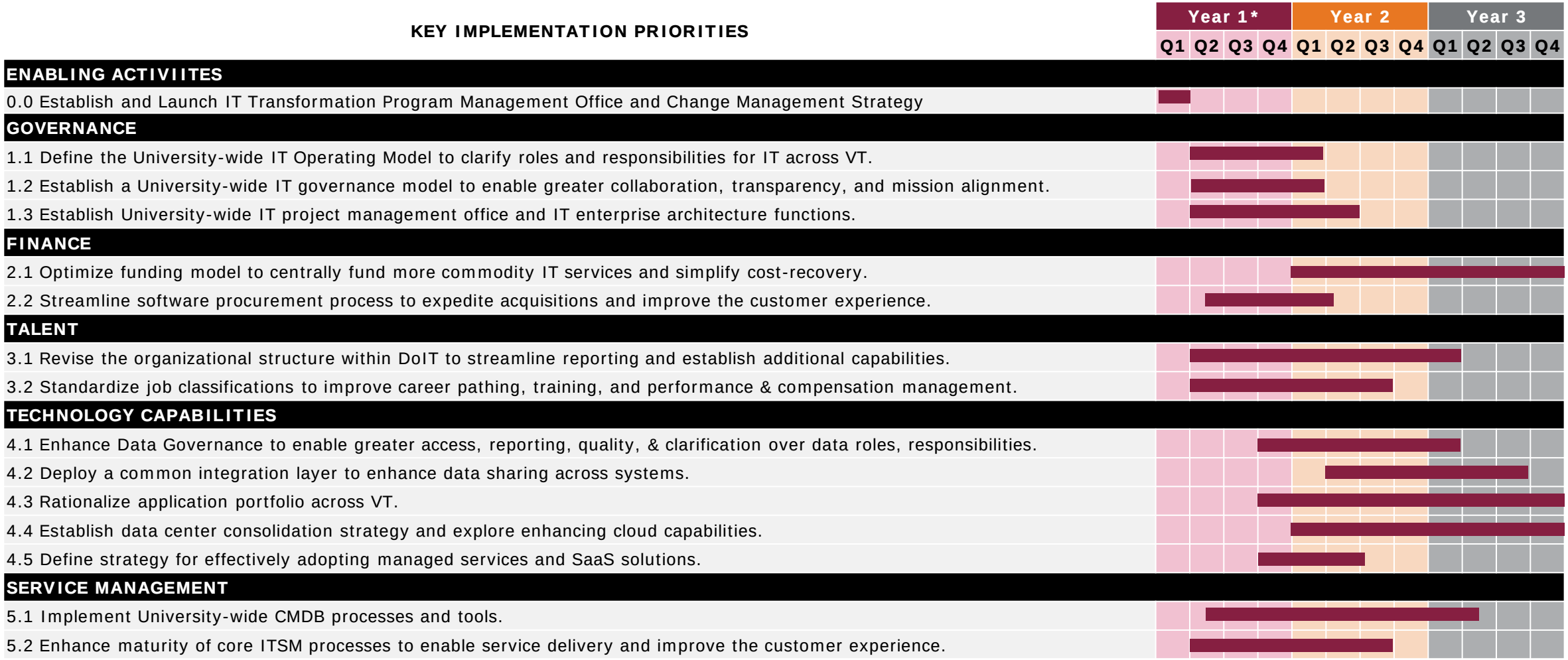
Next Steps

High Level Implementation Plan

VT should realign the IT operating model and strengthen the foundation of IT services before rationalizing common administrative and academic services.



*Note: Timeline represents a calendar year with an assumed start date of Monday January 3rd, 2022

KEY: Implementation Timeline

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Where to begin?

Fourteen projects are a significant undertaking and invite the questions: What do we do now that we have these recommendations? Where do we start?

Short Term

- Regroup on areas requiring further discussion.
- Review opportunities and prioritize.
- Identify high-level cost and staffing estimates.
- Receive approvals for prioritized projects.

Program Initiation

- Define:
  - Program and project management
  - Change management plan
  - Owners and resources for selected projects
- Initiate detailed design and implementation planning.

Appendix

Future State Recommendation Prioritization Inputs

Recommendation Number	Focus Area	Recommendation Description	Effort Level	Risk Level	Impact Level	Approx. Time to Complete
1.1	Governance	Define the University-wide IT Operating Model to clarify roles and responsibilities for IT across VT.	High	High	High	12 Months
1.2	Governance	Establish a University-wide IT governance model to enable greater collaboration, transparency, and mission alignment in IT .	Medium	Medium	High	12 Months
1.3	Governance	Establish a University-wide project management office with defined tools and methods to more effectively manage large University-wide IT projects and initiatives.	Medium	Medium	Medium	15 Months
2.1	Finance	Optimize funding model to centrally fund more commodity IT services and simplify cost-recovery	High	Medium	Medium	24 Months
2.2	Finance	Streamline software procurement process to expedite acquisitions and improve the customer experience.	High	Medium	Medium / High	12 Months
3.1	Talent	Revise the organizational structure within DoIT to streamline reporting and establish additional capabilities.	Medium	Medium	Medium / High	24 Months
3.2	Talent	Standardize job classifications for IT staff across VT to improve career pathing, training, and performance & compensation management.	Medium	Medium	High	18 Months
4.1	Technology Capabilities	Enhance Data Governance to enable greater access, reporting, quality, and clarification over data roles and responsibilities.	Medium	Medium	High	18 Months
4.2	Technology Capabilities	Deploy a common integration layer to enhance data sharing across systems.	Medium	Low	Medium	18 Months
4.3	Technology Capabilities	Rationalize application portfolio across VT.	High	High	High	30 Months
4.4	Technology Capabilities	Establish data center consolidation strategy and explore enhancing cloud capabilities.	High	Medium	Medium / High	27 Months
4.5	Technology Capabilities	Define strategy for effectively adopting managed services and SaaS solutions.	Medium	Medium	Medium	10 Months
5.1	Service Management	Implement University-wide CMDB processes and tools.	High	Medium	Medium / High	24 Months
5.2	Service Management	Enhance maturity of core ITSM processes to enable service delivery and improve the customer experience.	Medium	Medium	Medium / High	18 Months

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IT Service Management Glossary

Word / Acronym	Meaning
KPI	Key Performance Indicator
API	Application Programming Interface
CMDB	Configuration Management Database
ITSM	IT Service Management
IM	Incident Management
PM	Problem Management
CM	Change Management
SLA	Service Level Agreement

