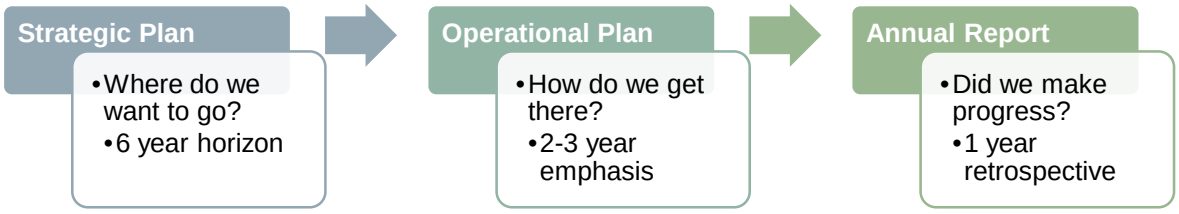
2014-2016 Virginia Tech IT Operational Plan

Contents

Preface to the 2014-2016 IT Operational Plan

It is my pleasure to present this operational plan for the Information Technology organization for 2014-2016. This operational plan for the IT organization provides a detailed set of goals, initiatives, and tasks to realize the seven pillars of the IT strategic plan and to support the university's long-range plan, "A Plan for a New Horizon – Envisioning Virginia Tech 2012-2018." The content of this plan was collaboratively developed across the entire IT organization over the past year. The Operational Plan is designed to serve as a living bridge between the IT Strategic Plan and the IT Annual Report, creating a logical and traceable flow among the three documents.



It is noted that the IT organization provides many services that are critical to the successful operation of the university, most of which are not directly addressed in the strategic plan or operational plans. We must continually strive to improve the effectiveness of these services to further the university's missions and goals. And, the IT organization must continue to grow into its role as consultant and broker, as well as infrastructure operator and service provider, given the changing landscape of information technology. This operational plan, consistent with the strategic plan's vision, details progress areas requiring particular focus and attention due to their importance to Virginia Tech's long-range plan and/or a need for change in what the IT organization does or how the IT organization functions.

Information technology and the associated requirements for information technology services change rapidly. Therefore, this IT operational plan, like the IT strategic plan and a "A Plan for a New Horizon," is a "living document that guides our efforts while it is continually tested and revised." The IT organization, in conjunction with others, will review, reassess and update this operational plan, as needed and at least every two years. The IT organization looks forward to collaboration with others from across the university and beyond to realize "A Plan for a New Horizon" and the strategic plan for IT, supported by the specific goals and actions detailed in this operational plan.

I greatly appreciate the ideas and energy that many have contributed to this process. I offer special thanks to Dr. Claire Krendl Gilbert, Associate Director for Strategy and Analysis, for her efforts in organizing the Operational Plan and the process that led to its creation.

Scott F. Midkiff
Vice President for Information Technology and Chief Information Officer
August 26, 2014

Acronym Dictionary

IT Group Acronyms

- ARC: Advanced Research Computing
- CCS: Collaborative Computing Solutions
- CTSSR: Converged Technologies for Security, Safety, and Resilience
    - IMS: Identity Management Services
- ITSO: Information Technology Security Office
- NI&S: Network Infrastructure & Services
    - UAS: Unix Administrative Services
    - 4HELP: Computing support team
- SETI: Secure Enterprise Technology Initiatives
- TLOS: Technology-enhanced Learning and Online Strategies
    - DMS: Digital Media Services
    - OTA: Office of Technology for the Arts
    - NetPed: Networked Pedagogies
        - NLI: Networked Learning Initiative
        - ATEL: Active Technologies for Engaged Learning
        - GEDI: Graduate Education Initiative
    - NKCS: Networked Knowledge and Collaboration Services
    - NKE: Networked Knowledge Environments
    - NLDS: Networked Learning and Design Strategies
- VPIT: Vice President for Information Technology
    - ITA: Information Technology Acquisitions

Other Virginia Tech Acronyms

- A/P Faculty: Administrative and Professional Faculty
- BIS: Business Intelligence System
- BPM: Business Process Management
- BYOE: Bring Your Own Everything
- CAS: Central Authentication Service
- CFA: Center for the Arts
- CFO: Chief Financial Officer
- CIDER: Center for Instructional Development and Educational Research
- CLE: Curriculum for Liberal Education
- COOP: Continuity Of Operations
- CPU: Central Processing Unit
- DAS: Distributed Antenna System
- FLOPS: FLoating-Point Operations Per Second
- GIS: Geographic Information Systems
- HPC: High Performance Computing
- HR: Human Resources
- ICAT: Institute for Creativity, Arts, and Technology
- LMS: Learning Management System

- NCR: National Capital Region
- NOC: Network Operations Center
- OEM: Office of Emergency Management
- PID: Personal Identifier
- RLAN: Restricted Limited Access Network
- SPOT: Student Perception of Teaching
- VBI: Virginia Bioinformatics Institute
- VPAS Facilities & Space Mgmt: Vice President for Administration, Facilities and Space Management group
- VTIP: Virginia Tech Intellectual Properties
- VTTI: Virginia Tech Transportation Institute

External Organization Acronyms

- CC-NIE: Campus Cyberinfrastructure - Network Infrastructure and Engineering
- CIFER: Computational Intelligence for Financial Engineering and Economics
- EDUCAUSE: EDUCAUSE nonprofit association
- Eduroam: Education Roaming
- LARPP: Lifestyles of the Attribute Rich and Privacy Preserved
- NSF: National Science Foundation
- SANS: SANS Institute
- SAML: Security Assertion Markup Language
- XSEDE: Extreme Science and Engineering Discovery Environment

Pillar 1: Enabling Networked Learning in the Networked University

Strategic Areas

Pillar 1 of the IT Strategic Plan cultivates the impact that IT can have upon teaching and learning in the context of networked learning. For IT, this involves work in two major areas. First, IT will focus on advancing- online and technology-enhanced education to enable networked learning[1] and advance "the skills and conceptual frameworks necessary to use technology to provide meaningful student-to-student and student-to-faculty interaction, active learning opportunities, and timely and constructive feedback" (The Plan for a New Horizon). Second, IT will cultivate a role in supporting computational thinking[2] as envisioned in The Plan for a New Horizon.

Area 1: **Online and technology-enhanced education**

Area 2: **Computational thinking**

Major Goals

The major goals for each area are as follows:

Area 1: Online and technology-enhanced education

- Goal 1: Help faculty develop technology-enhanced learning strategies including support for effective design of learning activities and innovative instructional strategies
- Goal 2: Investigate, develop, and utilize current tools and emerging technologies to enhance learning environments.

Area 2: Computational thinking

- Goal 3: Translate the goal of computational thinking from The Plan for a New Horizon to the context and activities of the IT organization.

Key Initiatives/Strategies

Three key initiatives, listed below by goal, will be the focus of Pillar 1 for 2014-2016.

Area 1/Goal 1: Transforming teaching and learning	• I1: Provide creative, technical, and financial support for faculty members and graduate teaching assistants engaged in online and technology-enhanced education
Area 1/Goal 2: Enhanced learning environments	• I2: Address the charge of The Plan for a New Horizon to "develop an appropriate infrastructure for e-learning", including a defined institutional approach to online learning
Area 2/Goal 3: Computational thinking	• I3: Foster computational thinking across the university

[1] IT Strategic Plan: Networked learning connects "disciplinary expertise, pedagogy and technology to improve the quality, effectiveness, and efficiency of teaching and learning…Networked learning includes online learning's anytime, anywhere connectivity between students and course content and between students and a learning community, but clearly recognizes that this connectivity can benefit all of our students, both on campus and at a distance spanning geographic scales, and in traditional, hybrid, and fully-online classes".

[2] From Wing, J.M. (2006). Computational thinking. *Communications of the ACM*, 49(3), pp.33-34:
"Computational thinking involves solving problems, designing systems, and understanding human behavior, by drawing on the concepts fundamental to computer science". Computational thinking is a "fundamental skill for everyone" and includes aspects such as:

- "Reformulating a seemingly difficult problem into one we know how to solve, perhaps by reduction, embedding, transformation, or simulation"
- "Thinking recursively"
- "Using abstraction and decomposition when attacking a large complex task or designing a large complex system"
- "Thinking in terms of prevention, protection, and recovery from worst-case scenarios through redundancy, damage containment, and error correction"
- "Using heuristic reasoning to discover a solution"

Area 1/Goal 1: Transforming teaching and learning

Initiative 1

Description

Provide creative, technical, and financial support for faculty members and graduate teaching assistants engaged in online and technology-enhanced education

2014-2016 Initiative 1 Tasks and Projects

Task 1.1.1.1.1	**Explore, encourage, and support technology-enhanced active learning (TEAL) as part of the ongoing refresh of TLOS' teaching and learning initiatives.**		
	Primary parties: TLOS	Partners: NI&S CCS ARC	Resources: Additional resources would be needed to support network or other infrastructure changes or upgrades related to this task
	Demonstration of Progress and Deliverables: 1. Establish appropriate programs and opportunities to nurture a culture that recognizes the value of the networked university and rewards the collaboration and innovation necessary for networked learning 2. Engage with university units to assist with development and implementation of networked learning goals 3. Provide services and supporting infrastructure to enable and encourage networked learning 4. For each academic year, identify content, format, and strategic goals for the NLI that support meaningful, challenging, and intellectually stimulating development experiences for 25% of faculty (NLI), for graduate teaching assistants participating in the Transformative Graduate Education Initiative (GEDI), and for faculty and undergraduate students working on portfolios (ATEL) 5. Encourage sharing of innovative strategies within the campus, region, and global communities for teaching and learning with technology		Responsible for tracking/doing #1: TLOS, NI&S #2: TLOS (NetPed) #3: TLOS (NetPed, NKCS), NI&S #4-5: TLOS
Task 1.1.1.1.2	**Expand strategic course redesign, program development, course development, and assessment efforts across the range of teaching modalities.**		
	Primary parties: TLOS (NLDS, NetPed)	Partners:	Resources: Additional resources would be needed, particularly human resources and development infrastructure that would allow a more agile approach to the development of instructional solutions
	Demonstration of Progress and Deliverables: 1. Restructuring programs, services, and organizational structures as necessary to support and initiate this expansion 2. Number, scope, and scale of redesign efforts		Responsible for tracking/doing #1: TLOS #2: TLOS (NLDS)
Task 1.1.1.1.3	**Advance and streamline the TLOS grant processes and programs to encourage innovative uses of instructional technologies across Virginia Tech.**		
	Primary parties: TLOS (NetPed, Executive Director, NKE, NLDS)	Partners: TLOS Stakeholders Committee	Resources:
	Demonstration of Progress and Deliverables: 1. Develop mechanisms to focus and guide grant work (e.g., a theme year for TLOS) 2. Establish a unified web presence for TLOS grant activities		Responsible for tracking/doing #1-2: TLOS

Area 1/Goal 2: Enhanced learning environments

Initiative 2

Description

Address the charge of The Plan for a New Horizon to "develop an appropriate infrastructure for e-learning", including a defined institutional approach to online learning[3].

2014-2016 Initiative 2 Tasks and Projects

<table>
<tr><td rowspan="3">Task 1.1.2.2.1</td><td colspan="3">Provide an agile and responsive environment for discovering, evaluating and disseminating new applications of emerging technologies and pedagogies.</td></tr>
<tr><td>Primary parties:
TLOS</td><td>Partners:
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, VPIT)</td><td>Resources:
Reallocation of personnel and restructuring of funding models and budget sources, including the TLOS grants program, may be necessary to ensure progress</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Monitor and evaluate the technology landscape for emerging tools and practices; model the phases of innovation, including pilot testing, assessing, communicating, and promoting successful use cases
2. Monitor, evaluate and promote the use of digital media and ePortfolio-related emerging technologies that enhance the creation and curation of personal learning environments and networks, and deepen teaching, learning, research, and outreach
3. Create opportunities for faculty, staff, and students to explore, implement, evaluate and champion new technologies that allow for a truly networked university and digitally-fluent faculty, staff and students
4. Increase the visibility, prominence and potential for pedagogy- and technology-transfer of emerging technologies projects (e.g., XCaliber awards)
5. Establish procedures to report on sandbox activities in this space and define processes by which sandbox activities will advance or be retired
6. Explore potential collaboration opportunities with relevant academic and administrative units across campus (e.g., ICAT, The Graduate School, the Libraries)</td><td>Responsible for tracking/doing
#1-6: TLOS</td></tr>
<tr><td rowspan="3">Task 1.1.2.2.2</td><td colspan="3">Define, advocate, model, and support evolution of virtual learning spaces and systems to advance 21st century learning environments.</td></tr>
<tr><td>Primary parties:
TLOS</td><td>Partners:
NI&S
CTSSR (IMS)
SETI
ICAT
CCS
ARC
Libraries
VPIT (ITA)</td><td>Resources:
As noted in Pillar 3, integration with NI&S and investment in expanded networking and communications infrastructure will be needed. Storage needs will also increase significantly as lecture capture increases in popularity and may require expansion of storage infrastructure and capabilities.</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Explore and recommend solutions for remote identity validation and authentication, online testing, proctoring, etc.
2. Promote and explore a "digital campus/digital citizenship" initiative to help students develop digital competency for the 21st century in collaboration with strategic partners and stakeholders across Virginia Tech, including Undergraduate and Graduate Studies, Student Affairs, Academic Advising, and others
3. Expand teaching and learning-focused video and multimedia content production by Digital Media Services
4. Expand use of and support for new synchronous and asynchronous enterprise-level digital video and multimedia capabilities for web conferencing, classes, meetings, ad-hoc collaborations, and other events
5. Begin planning for Virginia Tech's next generation learning management system (LMS) to improve the end-user experience, flexibility, system performance, configuration management, and mobile accessibility for both the LMS and course evaluation systems
6. Strategically explore enhancing remote access to provide all learners, regardless of location, with access to specialized software, technologies and services</td><td>Responsible for tracking/doing
#1: TLOS (NLDS), CTSSR (IMS), SETI
#2: TLOS and ARC
#3: TLOS
#4: TLOS, CCS
#5: TLOS, Enterprise Systems
#6: TLOS, NI&S, SETI, CTSSR (IMS), CCS
#7-10: TLOS</td></tr>
</table>

[3] See Pillar 3 for transformation of physical spaces

Area 1/Goal 2: Enhanced learning environments		
Initiative 2		
	7. Actively engage the university community in advancing web accessibility, universal design of course materials, and education about assistive technologies 8. Advance digital preservation efforts in partnership with the Libraries, by developing guidelines for preservation of institutional resources and promoting access in digital repositories 9. Foster adoption of networked university pedagogies and technologies that improve learning and facilitate collaboration, reflection, sharing, curation, review, assessment and universal access 10. Investigate opportunities to leverage and advance learning analytics to determine the effectiveness of new or upgraded virtual learning spaces and systems	

Area 2/Goal 3: Computational thinking

Initiative 3

Description

Foster computational thinking across the university.

2014-2016 Initiative 3 Tasks and Projects

<table>
<tr><td rowspan="2">Task 1.2.3.3.1</td><td colspan="3">Provide centralized services and infrastructure necessary to support and facilitate/encourage the integration of computational thinking into teaching and learning at Virginia Tech</td></tr>
<tr><td>Primary parties:
TLOS
ARC</td><td>Partners:
CCS
NI&S</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Promote usage of the ARC Visionarium Lab and computational thinking-oriented NLI courses from ARC
2. Develop partnerships with academic units and institutes to seek funding opportunities to cultivate computational-thinking skills for students
3. Launch the Computing 101 and Introduction to Scholar sites to consolidate tailored device setup instructions and information about Virginia Tech passwords and implementation of computing best practices. Seek opportunities to partner with other entities to encourage participation (e.g., Student Affairs)
4. Promote and facilitate a culture of ePortfolio thinking via ATEL activities that will encourage students to have “multiple opportunities to interact meaningfully with technology in order to sharpen analytical skills, foster abstract thinking, enable the effective synthesis and manipulation of data, and improve fluency with the computational methods and models that are necessary to solve otherwise intractable problems,” as stated in The Plan for a New Horizon, including:
a. Develop an annual program inviting faculty and graduate teaching assistants to reflect on and grow their ePortfolio use within their curriculum, to engage and experience the ePortfolio use within academic contexts, and to share experiences with other academic programs engaging in ePortfolio use
b. Continue the annual student showcase for student ePortfolios where graduate and undergraduate students have the opportunity to share and demonstrate effective uses of their ePortfolios for use in research, learning, service, and professional growth</td><td>Responsible for tracking/doing
#1: ARC, TLOS
#2: All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)
#3: TLOS, NI&S and all other IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, SETI, VPIT)
#4: TLOS (NetPed)</td></tr>
<tr><td rowspan="2">Task 1.2.3.3.2</td><td colspan="3">Draw on the unique professional focus, personal expertise, and abilities of personnel within the IT organization to facilitate the application of computational thinking in real-world environments.</td></tr>
<tr><td>Primary parties:
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)</td><td>Partners:</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Identify and track IT organizational efforts to promote computational thinking in areas such as:
a. Organizational projects that support or further computational thinking
b. IT student internships and employment
c. Faculty engagement with the IT organization (e.g., showcases, course redesigns)
2. Raise awareness of and continue teaching and guest lecturing efforts by IT personnel
3. Implement mechanisms to work with academic units to create informal mentoring opportunities between IT leaders and students interested in entering the industry</td><td>Responsible for tracking/doing
#1-3: All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)</td></tr>
</table>

Pillar 2: Providing competitive advantage through sustainable, advanced cyberinfrastructure and collaboration

Strategic Areas

Pillar 2 of the IT Strategic Plan provides Virginia Tech with competitive advantage through the provision of outstanding cyberinfrastructure[4] capabilities to researchers, and ensuring that those resources are extensively leveraged through collaboration within and outside Virginia Tech. Fulfilling the vision of Pillar 2 requires effort in both areas. First, Virginia Tech must scale up its cyberinfrastructure to support high performance computing (HPC), visualization, and other components of the Virginia Tech cyberinfrastructure at new levels. Second, IT must play a deliberate role in increasing the frequency and quality of collaboration in these areas within and outside the institution.

Area 1: Scaling up

Area 2: Increased collaboration

Major Goals

The major goals for each area are as follows:

Area 1: Scaling up

- Goal 1: Provide outstanding, leading edge institutional resources to researchers by significantly expanding the stability, scale, capabilities, and services of Virginia Tech's cyberinfrastructure

Area 2: Increased Collaboration

- Goal 2: Nurture a collaborative community of scholars, practitioners, and educators at Virginia Tech in areas related to cyberinfrastructure to encourage innovation and investment
- Goal 3: Increase the number, type, and frequency of collaborations, outreach, and communications activities related to cyberinfrastructure with external people and groups to expand opportunities and further Virginia Tech's reputation

Key Initiatives/Strategies

Four key initiatives, listed below by goal, will be the focus of Pillar 2 for 2014-2016.

Area 1/Goal 1: Leading edge institutional resources

- I1: Significantly expand, support, and facilitate access to cyberinfrastructure resources for university researchers to ensure that the university community is able to access and make effective use of these resources
- I2: Finalize planning for a new university data center that will serve as a leading-edge, multi-functional space that provides a living laboratory for research and hands on teaching using contemporary design and is sustainable, resilient, and resilient, and secure

Area 2/Goal 2: Collaboration within Virginia Tech

- I3: Meaningfully increase the number and frequency of cyberinfrastructure-related collaborations across campus and expand comprehensive education, training, and outreach programs that emphasize best practices and innovation in HPC, visualization, and research computing in general to promote a culture of computational thinking across the university

Area 2/Goal 3: Collaboration and outreach outside Virginia Tech

- I4: Expand outreach and accelerate partnership efforts on cyberinfrastructure for research, especially innovation in research support; provisioning of resources and services; initiation; and leadership at the local, national, and international level

[4] "Cyberinfrastructure is a term first used by the US National Science Foundation (NSF), and it typically is used to refer to information technology systems that provide particularly powerful and advanced capabilities" (Indiana University). This operational plan leverages the definition of cyberinfrastructure articulated by Indiana University: "Cyberinfrastructure consists of computing systems, data storage systems, advanced instruments and data repositories, visualization environments, and people, all linked by high speed networks to make possible scholarly innovation and discoveries not otherwise possible."

Area 1/Goal 1: Leading edge institutional resources

Initiative 1

Description

Significantly expand, support, and facilitate access to cyberinfrastructure resources for university researchers to ensure that the university community is able to access and make effective use of these resources.

2014-2016 Initiative 1 Tasks and Projects

<table>
<tr><td rowspan="3">Task 2.1.1.1.1</td><td colspan="3">Develop the HPC and visualization program within Advanced Research Computing (ARC) to meet growing demand, enable research only possible using HPC, and make the most effective use of resources</td></tr>
<tr><td>Primary parties:
ARC
NI&S</td><td>Partners:
VPIT</td><td>Resources:
Personnel for system administration and operations (at least 2 positions) and computational science (at least 1 position); equipment funds preferably on a more planned basis</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Work with partners across campus to obtain an annual budget for Advanced/High Performance Research Computing that provides sustained, predictable, and strategic investments. This should include:
a. A viable 3-5 year Research Computing plan to invest in personnel, operations, licenses, and maintenance/replacement which would complement opportunistic investments in HPC, storage, and networking infrastructure
2. Provide and maintain a stable computing platform for research computing at the scale of the university. Demonstrate progress via metrics and data that include:
a. Tracking/documentation of system uptime; implementation of system enhancements to increase uptime
b. Usage rates (e.g., percent utilization) of central HPC resources
c. Number of faculty and student researchers using ARC resources
d. Tracking external grants and/or contracts that leverage HPC resources
e. Time to implementation of new hardware
f. Total computational capacity (e.g., FLOPS) of ARC systems
g. User satisfaction surveys on some regular basis, perhaps with a different theme for different surveys</td><td>Responsible for tracking/doing
#1: VPIT, ARC
#2: ARC</td></tr>
<tr><td rowspan="3">Task 2.1.1.1.2</td><td colspan="3">Research, develop, and implement improved policies, structures, and user environments designed to ensure that systems are scalable, accessible, and useful for all computational researchers, on a range of applications, and which streamline the research process and ensure efficient management of HPC and visualization resources</td></tr>
<tr><td>Primary parties:
ARC</td><td>Partners:
VPIT
NI&S (UAS)</td><td>Resources:
Web development resources, system administrator assistance, general personnel additions (see above)</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Number of faculty and student researchers using ARC resources
2. Implementation of a feedback mechanism to measure progress in meeting needs of the research community (broader than just the current user base)
3. The implementation of allocation mechanisms (e.g., user portal and allocation system) for node dedication and job priority including investment-based allocation for all users. (ARC will work to implement allocation/investment-based cluster hosting for HPC to leverage funds across the university from start-up packages, research infrastructure support, and sponsored programs to build HPC capacity while, also, increasing effectiveness for the investors by guaranteeing allocations and reducing costs for system support, space, and building infrastructure compared to distributed operation of stand-alone systems.)</td><td>Responsible for tracking/doing
#1-3: ARC</td></tr>
<tr><td rowspan="3">Task 2.1.1.1.3</td><td colspan="3">Investigate and implement measures to encourage researchers and units or groups across campus to invest in a centrally-hosted HPC model</td></tr>
<tr><td>Primary parties:
ARC</td><td>Partners:
VPIT</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Participation in the cluster system based on financial investment</td><td>Responsible for tracking/doing
#1: ARC</td></tr>
</table>

<table>
<tr><td colspan="4">Area 1/Goal 1: Leading edge institutional resources</td></tr>
<tr><td colspan="4">Initiative 1</td></tr>
<tr><td rowspan="3">Task
2.1.1.1.4</td><td colspan="3">Collaboratively develop and support strategies for addressing research data and provide migration consulting to researchers as appropriate</td></tr>
<tr><td><u>Primary parties:</u>
ARC</td><td><u>Partners:</u>
University libraries
NI&S
ITSO</td><td><u>Resources:</u>
Funding for acquisition of data transfer capabilities (e.g., Globus)</td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Demonstrated improvements in secure data movement, data preservation, and repository development capabilities
2. Development and implementation of data migration services for HPC systems</td><td><u>Responsible for tracking/doing</u>
#1: ARC and University Libraries
#2: ARC</td></tr>
<tr><td rowspan="3">Task
2.1.1.1.5</td><td colspan="3">Provide direct user support, from basic acclimation to HPC environments to code parallelization/optimization, to assist researchers with migration to appropriate HPC platforms</td></tr>
<tr><td><u>Primary parties:</u>
ARC</td><td><u>Partners:</u></td><td><u>Resources:</u>
Sustainable funding and other development resources as needed</td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Number of researchers assisted in migration to new or more appropriate HPC platforms
2. Collaborations between ARC and research groups
3. Number/size of focused training/educational offerings and collaborations
4. Development and implementation of migration plans for HPC resources</td><td><u>Responsible for tracking/doing</u>
#1-4: ARC</td></tr>
</table>

Area 1/Goal 1: Leading edge institutional resources			
Initiative 2			
Description			
Finalize planning for a new university data center that will serve as a leading-edge, multi-functional space that provides a living laboratory for research and hands on teaching using contemporary design and is sustainable, resilient, and secure			
2014-2016 Initiative 2 Tasks and Projects			
Task 2.1.1.2.1	**Determine how to most effectively meet HPC and other research cyberinfrastructure needs using the existing and new data centers**		
	Primary parties: ARC NI&S	Partners: University and external stakeholders ITSO	Resources:
	Demonstration of Progress and Deliverables: 1. Development and implementation of design criteria relevant to HPC		Responsible for tracking/doing #1: ARC and NI&S
Task 2.1.1.2.2	**Determine how to most effectively and securely facilitate research and teaching in the design of the new data center (e.g., campus location, common work spaces for user- and system-facing personnel, classrooms for hands-on interaction with HPC/vis clusters)**		
	Primary parties: ARC NI&S	Partners: VPIT ITSO TLOS (NKE) Registrar (Audio Visual/Classroom)	Resources:
	Demonstration of Progress and Deliverables: 1. Pursuit of research collaborations and funding opportunities enabled by the new facility		Responsible for tracking/doing #1: ARC
Task 2.1.1.2.3	**Seek “green” alternatives to mitigate electric power consumption.**		
	Primary parties: ARC NI&S	Partners:	Resources:
	Demonstration of Progress and Deliverables: 1. Provide leadership and evaluate new technologies for the new university data center		Responsible for tracking/doing #1: ARC, NI&S

Area 2/Goal 2: Collaboration within Virginia Tech

Initiative 3

Description

Meaningfully increase the number and frequency of cyberinfrastructure-related collaborations across campus and expand comprehensive education, training, and outreach programs that emphasize best practices and innovation in HPC, visualization, and research computing in general to promote a culture of computational thinking across the university.

2014-2016 Initiative 3 Tasks and Projects

<table>
<tr><td rowspan="3">Task 2.2.2.3.1</td><td colspan="3">Develop and provide state of the art research computing training and open workshops and engagement events for faculty, students, and staff in all disciplines at all Virginia Tech locations with a specific focus on best practices in research methods, and data-intensive and high performance computing, interdisciplinary research.</td></tr>
<tr><td>Primary parties:
ARC</td><td>Partners:
University libraries
TLOS (NLI, NKE, NLDS, DMS)</td><td>Resources:
A director of education and outreach would be needed to provide a program at a much larger scale than today</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. The development and implementation of an external speaker series, internal showcase events, and recognition awards and arrange and implement NLI credit or badging for participation
2. The creation and implementation of a university-wide graduate HPC certificate or similar program that provides graduate students with knowledge of practical aspects and best practices of advanced research computing and enables them to leverage this knowledge for research
3. Adapt and deliver existing educational and user support programs to off-campus users, such as those at the National Capital Region and Virginia Tech Carillion Research Institute
4. Training participant feedback on the usefulness of ARC sessions
5. Number, size, subject coverage, and level of participation/attendance of ARC educational and training offerings
6. Incorporation of HPC concepts and/or ARC resources (computational clusters and/or visualization resources) into existing or new for-credit academic courses</td><td>Responsible for tracking/doing
#1: ARC and TLOS
#2-6: ARC</td></tr>
<tr><td rowspan="3">Task 2.2.2.3.2</td><td colspan="3">Increase participation of the IT organization in sponsored research projects through collaboration with academic faculty, units, and independently in areas of strategic importance.</td></tr>
<tr><td>Primary parties:
ARC
NI&S</td><td>Partners:</td><td>Resources:
A director of education and outreach would be needed and staff capacity would be needed to dedicate to this effort to provide a program at a much larger scale than today</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Seek out, encourage, and assist researchers applying for grants focused on key areas, including:
a. Recruiting, training, and retaining a diverse workforce in cyberinfrastructure
b. Leadership in cyberinfrastructure
2. Develop partnerships between ARC and researchers or groups from both Blacksburg and non-Blacksburg locations
3. Number or scope of new faculty collaborations, including collaborative publications, grants & contracts</td><td>Responsible for tracking/doing
#1-3: ARC</td></tr>
</table>

Area 2/Goal 3: Collaboration and outreach outside Virginia Tech

Initiative 4

Description

Expand outreach and accelerate partnership efforts on cyberinfrastructure for research, especially innovation in research support; provision of resources and services; initiation; and leadership at the local, national, and international level

2014-2016 Initiative 4 Tasks and Projects

Task 2.2.3.4.1	**Facilitate access to national-scale HPC resources for Virginia Tech researchers working on large-scale computational problems**		
	Primary parties: ARC	Partners: NI&S	Resources:
	Demonstration of Progress and Deliverables: 1. Track the allocation of researcher CPU time on national computing environments 2. Document the impact access to national resources has for VT researchers 3. Success rate of applications to obtain access to national resources		Responsible for tracking/doing #1-3: ARC
Task 2.2.3.4.2	**Seek out opportunities to partner with other universities and national labs to develop leading edge regional and national programs, shared resources, shared sites, expanded capabilities, and grant partnerships (e.g. NSF, University of Virginia, CC-NIE, XSEDE)**		
	Primary parties: ARC NI&S	Partners: TLOS (NLI, NKE, NKCS)	Resources:
	Demonstration of Progress and Deliverables: 1. Work to create and track metrics on shared trainings, software licenses, and other educational partnerships with groups outside Virginia Tech 2. Develop a leadership HPC program for universities in Virginia 3. Work with other Virginia institutions on projects that add innovative and cost-effective high-end capabilities to the suite of research computing services 4. Researcher usage of collaboration technologies offered by IT 5. Expand partnership with XSEDE to streamline the offering of resources at Virginia Tech (e.g., system or education resources)		Responsible for tracking/doing #1-3: ARC #4: TLOS (NKE and NKCS) #5: ARC
Task 2.2.3.4.3	**Seek new and innovative mechanisms to highlight Virginia Tech's research computing accomplishments to an international audience and establish the institution's reputation as a key player in the field**		
	Primary parties: ARC	Partners: VPIT	Resources: Assistance needed with creating publicity documents and/or marketing
	Demonstration of Progress and Deliverables: 1. Make live and/or asynchronous packaged trainings or demonstrations available to global community 2. Publicize the number of articles produced in top journals using Virginia Tech cyberinfrastructure		Responsible for tracking/doing #1: ARC and TLOS #2: ARC

Pillar 3: Leveraging IT to distinguish the Virginia Tech experience

Strategic Areas

Pillar 3 of the IT Strategic Plan is specifically focused on the impact that IT can have upon distinguishing Virginia Tech—in both its physical and virtual forms—as an institution with a "superior research, learning, and workplace"[5] environment. For IT, this involves work in two major areas. First, IT should ensure that Virginia Tech becomes an institution with a competitive technology-enhanced environment in its physical spaces. Second, IT should elevate the experience of people who use technology to work and study at Virginia Tech by taking steps to embrace and enable the Bring Your Own Everything (BYOE) movement. These constitute the three major strategic areas of the pillar: managed access, physical spaces, and BYOE.

Area 1: Physical Spaces | **Area 2: BYOE**

Major Goals

The major goals for each area are as follows:

Area 1: Physical Spaces

- Goal 1: Provide innovative "technology-drenched" spaces to distinguish the physical university experience from the virtual university experience
- Goal 2: Sustain and innovatively improve converged technologies for safety and security on campus

Area 2: BYOE

- Goal 3: Leverage IT to enhance and enable the increasingly wide array of devices brought to campus to elevate the experience of students, faculty, staff, and visitors

Key Initiatives/Strategies

Four key initiatives, summarized below by goal, will be the focus of Pillar 3 for 2014-2016.

Area 1/Goal 1: Technology drenched spaces

- I1: Create financially sustainable technology drenched spaces at Virginia Tech by working with partners to design and promote utilization of specialized physical spaces across campus—especially in common areas of residence halls, study areas, and specifically featured venues—that offer unique forms of connectivity and tools for a broad set of university activities.

Area 1/Goal 2: Physical safety and security

- I2: Maintain and build Virginia Tech's leadership position in the development, enhancement, and deployment of emergency notification technologies
- I3: Leverage converged technologies to innovatively advance situational awareness in a university environment.

Area 2/Goal 3: BYOE

- I4: Embrace the BYOE movement across the teaching, research, administrative, and operational functions at Virginia Tech by purposefully facilitating the use of these devices on and off campus, and by making and distinctively leveraging significant upgrades to our underlying IT infrastructure.

[5] A Plan for a New Horizon

Area 1/Goal 1: Technology drenched spaces

Initiative 1

Description

Create financially sustainable, technology drenched spaces at Virginia Tech by working with partners to design and promote utilization of specialized physical spaces across campus—especially in common areas of residence halls, study areas, and specifically featured venues—that offer unique forms of connectivity and tools for a broad set of university activities.

2014-2016 Initiative 1 Tasks and Projects

<table>
<tr><td rowspan="3">Task 3.1.1.1.1</td><td colspan="3">Collaborate with groups across campus on the design or refresh of academic and residential spaces, including investment in telecommunications and networking infrastructure</td></tr>
<tr><td>Responsible parties:
TLOS (NKE)
NI&S</td><td>Partners:
VPIT</td><td>Resources:
Significant and sustained financial investment is needed for this area.</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Improve collaborations with capital project design so that IT has input from the beginning on new buildings
2. Partner with groups across campus to achieve diverse, robust, and reliable network access across a wide variety of devices used by students in residence halls and informal spaces, including the implementation of wall-to-wall wireless in all residence halls and the creation of technology-enabled spaces for collaboration to include connecting with offsite collaborators; Student Affairs may require significant financial investment
3. Document the number and types of consultations done by TLOS (NKE) for groups seeking assistance with the design of learning spaces
4. Develop improved mechanisms for tracking and documenting IT work on spaces
5. Work with partners to develop and articulate a strategy for technology/network access in outside spaces
6. Leverage the Herman Miller learning spaces research program to work with students on effective design
7. Determine financial and other adaptations that would be needed for students have robust access to technology at all VT locations, including virtual (e.g., Switzerland, NCR, graduate student off-campus needs)
8. Improved network speed, data transfer rates, system performance, utilization, resiliency, and cost effectiveness to meet current and future needs
9. Ability to demonstrate that VT cable infrastructure is prepared for future advances in information and communications technology</td><td>Responsible for tracking/doing
#1: VPIT, TLOS, NI&S
#2: TLOS (NKE), NI&S, VPAS Facilities & Space Mgmt, University leaders, Student Affairs
#3: TLOS (NKE)
#4: VPIT and TLOS (DMS and NKE)
#5: NI&S, TLOS (NKE), VPIT
#6: TLOS (NKE)
#7: NI&S, TLOS, VPIT
#8-9: NI&S</td></tr>
<tr><td rowspan="3">Task 3.1.1.1.2</td><td colspan="3">Collaborate with the Center for the Arts and the Institute for Creativity, Arts and Technology (ICAT) to develop plans for sustainable engagement and services</td></tr>
<tr><td>Responsible parties:
TLOS (OTA)
NI&S</td><td>Partners:
CFA and ICAT
VPAS Facilities & Space Mgmt</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Develop and implement a sustainable engagement plan</td><td>Responsible for tracking/doing
#1: TLOS (OTA), VPIT, and ARC</td></tr>
<tr><td rowspan="3">Task 3.1.1.1.3</td><td colspan="3">Launch the NLI Learning Studio as a showcase for technology-drenched spaces and an incubator for cross-pollination of ideas among disciplines</td></tr>
<tr><td>Responsible parties:
TLOS (NetPed and OTA)
ARC (Visionarium)</td><td>Partners:
DMS</td><td>Resources:
Requires sustainable funding for refreshing this space</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Investigate ways in which the space could be used for a faculty learning academy in partnership with groups across the organization as part of the re-imagining of the CLE
2. Host showcases and other events to raise awareness about the studio (e.g., internal showcase, profile in the Chronicle of Higher Education)
3. Produce an annual findings brochure about learning studio discoveries with an express filter for other campus entities that are working with learning spaces</td><td>Responsible for tracking/doing
#1: TLOS (NetPed), ARC (Visionarium)
#2-3: TLOS (NetPed)</td></tr>
</table>

<table>
<tr><th colspan="4">Area 1/Goal 1: Technology drenched spaces</th></tr>
<tr><th colspan="4">Initiative 1</th></tr>
<tr><td rowspan="3">Task
3.1.1.1.4</td><td colspan="3">Lead efforts with groups across campus to create a hands-on “creativity incubator” program, akin to Duke’s CoLab, focused on institutionally-oriented innovation</td></tr>
<tr><td><u>Responsible parties:</u>
TLOS (NKE, OTA)
Enterprise Systems
ITSO
NI&S
VPIT</td><td><u>Partners:</u>
ICAT
Library
ARC
SETI
CTSSR</td><td><u>Resources:</u>
Requires sustainable funding for establishing and maintaining this program</td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Identify and acquire needed resources
2. In collaboration with existing work across VT and within the community, develop and launch a portfolio of themed events in which the incubator could participate (e.g., a mobile application code-a-thon, hack-a-thon, using the new BIS, timetable overhaul, CLE reform/tool packaging)</td><td><u>Responsible for tracking/doing:</u>
#1: TLOS (NKE) & VPIT
#2: VPIT, TLOS, Enterprise Systems, ITSO, SETI</td></tr>
</table>

<table>
<tr><td colspan="4">Area 1/Goal 2: Physical safety and security</td></tr>
<tr><td colspan="4">Initiative 2</td></tr>
<tr><td colspan="4">Description</td></tr>
<tr><td colspan="4">Maintain and build Virginia Tech’s leadership position in the development, enhancement, and deployment of emergency notification technologies</td></tr>
<tr><td colspan="4">2014-2016 Initiative 2 Tasks and Projects</td></tr>
<tr><td rowspan="3">Task 3.1.2.2.1</td><td colspan="3">Work with other higher education institutions as well as local, state, and federal authorities to become a national participant in emergency notification technologies and create awareness of these initiatives and developments.</td></tr>
<tr><td><u>Responsible parties:</u>
NI&S</td><td><u>Partners:</u>
SETI (Middleware)
CTSSR
OEM</td><td><u>Resources:</u>
Requires additional personnel resources to complete and maintain</td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Develop and conduct strategic pilot projects to model best practices for other communities
2. Participate in higher education efforts to standardize interfaces for applications that produce and consume emergency notifications
3. Work with and advise university, state, and federal emergency management organizations to propose technology solutions to identified needs.
4. Conferences attended, papers published, consultations</td><td><u>Responsible for tracking/doing</u>
#1-4: NI&S</td></tr>
<tr><td rowspan="3">Task 3.1.2.2.2</td><td colspan="3">Explore and implement new capabilities in emergency notifications technologies at Virginia Tech</td></tr>
<tr><td><u>Responsible parties:</u>
NI&S</td><td><u>Partners:</u>
VPIT (ITA)
CTSSR
OEM</td><td><u>Resources:</u>
Requires additional personnel resources to complete and maintain</td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Develop coordination and tracking mechanisms for work occurring with emergency notifications
2. Expand Virginia Tech’s access to emergency notification platforms by developing additional notification mechanisms focused on mobile devices
3. Explore open-source or privatized solutions for emergency notifications to improve the sustainability of systems, expand notification capabilities, and free staff capacity for innovation</td><td><u>Responsible for tracking/doing</u>
#1: VPIT (ITA), NI&S
#2-3: NI&S</td></tr>
</table>

Area 2/Goal 2: Physical safety and security			
Initiative 3			
Description			
Leverage converged technologies to innovatively advance situational awareness in a university environment.			
2014-2016 Initiative 3 Tasks and Projects			
Task 3.2.2.3.1	**Integrate geospatial data capabilities into processes and procedures for safety and security**		
	Responsible parties: CTSSR	Partners: Academic faculty OEM VPAS Facilities/Space Mgmt NI&S	Resources: Funding for geospatial positions and graduate students;
	Demonstration of Progress and Deliverables: 1. Facilitate availability of a user-friendly interface to leverage available Geographic Information System (GIS) data for improved public safety and facility planning 2. Enhance interoperability of geospatial data by documenting business processes, establishing geospatial data access policies and procedures, expanding data discovery infrastructure, and diversification of server platform components 3. Look at the number and types of situational tools developed that offer expanded capabilities using GIS data		Responsible for tracking/doing #1-3: CTSSR

Area 2/Goal 3: BYOE

Initiative 4

Description

Embrace the BYOE movement across the teaching, research, administrative, and operational functions at Virginia Tech by purposefully facilitating the use of these devices on and off campus, and by making and distinctively leveraging significant upgrades to our underlying IT infrastructure.

2014-2016 Initiative 4 Tasks and Projects

Task 3.2.3.4.1	**Extend Virginia Tech's reputation as a leader and model institution for regional, national, and international collaboration by expanding IT's historic model of communications and networking cooperation into complex, IT-initiated research, education, and infrastructure collaborations**		
	Responsible parties: VPIT NI&S CTSSR	Partners:	Resources: Personnel and technology resources would be needed
	Demonstration of Progress and Deliverables: 1. Achieving capabilities at or beyond the expectations the Internet2 Innovation Platform (https://www.internet2.edu/vision-initiatives/initiatives/innovation-platform/) 2. Success of the Regional 9-1-1 Technology Subcommittee and associated working groups to ensure robust connectivity between regional public safety access points and headquarters locations.		Responsible for tracking/doing #1: NI&S #2: CTSSR, NI&S, VPIT
Task 3.2.3.4.2	**Ensure, to the extent feasible, that data, voice, and advanced computing infrastructure and capabilities at Virginia Tech sites outside of the Blacksburg campus are comparable to and compatible with those on the Blacksburg campus, especially in the National Capital Region**		
	Responsible parties: NI&S	Partners: University entities responsible for remote locations	Resources: Significant and sustained financial investment is needed for this area
	Demonstration of Progress and Deliverables: 1. Work with university entities responsible for remote locations to conduct a gap analysis to determine Virginia Tech's capabilities, needs, and areas for prospective IT involvement for sites outside the Blacksburg campus 2. Ensure the availability of a state-of-the-art optical network infrastructure between Virginia Tech in Blacksburg and the National Capital Region		Responsible for tracking/doing #1: VPIT, NI&S, CCS, TLOS #2: NI&S
Task 3.2.3.4.3	**Improve cellular coverage and capacity so that mobile devices have better reception on campus by working with appropriate parties across and outside of campus to improve cellular coverage via the Distributed Antenna System (DAS).**		
	Responsible parties: NI&S	Partners: Cellular service providers University leadership VPAS Facilities & Space Mgmt TLOS (OTA) CFA	Resources: Participation by additional cellular service providers and funding for areas not currently sponsored by cellular service providers still required
	Demonstration of Progress and Deliverables: 1. A more robust third connection medium (wired, wireless, and cellular) for anyone on campus, particularly in: residence halls, the Moss Arts Center, athletics facilities		Responsible for tracking/doing #1: NI&S
Task 3.2.3.4.4	**Engage faculty and students with emerging technologies relevant to BYOE to demonstrate opportunities to effectively use BYOE devices within and outside of the classroom**		
	Responsible parties: TLOS (NLI, NKE, NKCS)	Partners: NI&S ITSO CTSSR (IMS) SETI Enterprise Systems	Resources: Financial investment may be needed to address bandwidth impact from additional use of devices on the network

Area 2/Goal 3: BYOE		
Initiative 4		
	Demonstration of Progress and Deliverables: 1. Complete emerging technology investigation projects via the Tech Teams initiative and produce white papers related to BYOE for teaching and learning 2. Continue to provide and evaluate full-class sets of immersive emerging technologies for faculty and students (e.g., leverage the iPad class loan project to gather student and faculty feedback and consider new ways to leverage them in teaching and learning) 3. Encourage faculty and students to test emerging technologies for BYOE and classroom-based learning by working with ICAT to organize NLI "Field Trips to the Future" and showcasing model learning spaces as sandboxes for testing emerging technologies 4. Explore and potentially implement mobile single sign-on capabilities for BYOE 5. Investigate student expectations for mobile delivery of Virginia Tech online services	Responsible for tracking/doing #1-2: TLOS (NKE) #3: TLOS (NLI, OTA, NKE) #4: CTSSR (IMS), Enterprise Systems, SETI #5: Enterprise Systems, TLOS

Pillar 4: Advancing information technology for enterprise effectiveness

Strategic Areas

Pillar 4 of the IT Strategic Plan acknowledges the strategic importance of enterprise systems at Virginia Tech in creating an effective university[6]. The major strategic areas for enterprise systems occur on two fronts. First, IT should strive to transform the way the university relates to and uses its enterprise systems through the expansion of exemplary capabilities in support, services, and systems. Second, IT must ensure that Virginia Tech's enterprise systems are positioned for a future that will be defined by rapid change, constrained resources, and significantly expanded external options.

Area 1: Expanding exemplary capabilities

Area 2: Position enterprise systems for the future

Major Goals

The major goals for each area are as follows:

Area 1: Expanding exemplary capabilities

- Goal 1: Improve IT's agility and ability to responsively meet the institution's highest priority needs while using central and unit resources as effectively as possible
- Goal 2: Support the university's mission and activities with enterprise systems, applications, and data that exemplify industry standards for availability, reliability, security, sustainability, and robust functionality

Area 2: Position enterprise systems for the future

- Goal 3: Explore efficiencies, innovation, and effectiveness in enterprise systems and implement innovative technologies and services that serve as catalysts and enablers for advancing the missions of the university

Key Initiatives/Strategies

Four key initiatives, listed below by goal, will be the focus of Pillar 4 for 2014-2016.

Area 1/Goal 1: High priority needs and effective use of resources

- I1: Establish clear prioritization and resource management practices for collaborating with university constituents to deliver enterprise services that are aligned with strategic needs and adopt strategies that balance the demands of increasing compliance requirements with the need to be more rapid and flexible in the response and support offered for new institutional directions
- I2: Collaboratively define, standardize, and communicate policies and procedures for the development, maintenance, and support of enterprise applications

Area 1/Goal 2: Exemplary enterprise systems, applications, and data

- I3: Provide the Virginia Tech community with tools and support to access and analyze information at their own level of expertise.

Area 2/Goal 3: Efficiencies, innovation, and effectiveness

- I4: Seek opportunities to continuously improve change how Virginia Tech acquires and structures enterprise applications, systems, and services.

[6] In articulating the areas, goals, initiatives, and tasks of this pillar it is important to make the distinction between the IT organization Enterprise Systems and the actual "systems" enabled and supported by the organization on an enterprise-wide basis, which are referred to as lowercase enterprise systems in this document.

Area 1/Goal 1: High priority needs and effective use of resources

Initiative 1

Description

Establish clear prioritization and resource management practices for collaborating with university constituents to deliver enterprise services that are aligned with strategic needs and adopt strategies that balance the demands of increasing compliance requirements with the need to be more rapid and flexible in the response and support offered for new institutional directions

2014-2016 Initiative 1 Tasks and Projects

<table>
<tr><td rowspan="3">Task 4.1.1.1.1</td><td colspan="3">Work with partners across campus to design and implement a governance process for evaluating, approving, and prioritizing IT enterprise administrative initiatives from an overall university perspective.</td></tr>
<tr><td>Responsible parties:
VPIT</td><td>Partners:
University stakeholders
Some contributions may be needed from Enterprise Systems, CTSSR, CCS, TLOS, SETI, NI&S, ITSO, ARC</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. The development, approval, and implementation of prioritization and resource management practices for all university constituents
2. The creation of a process to notify requesters about outcomes of requests for enterprise administrative initiatives
3. Broaden the governance process to include analysis of anticipated needs in addition to analysis, tracking, and balancing requests for met needs (approved projects) and unmet needs (requested projects)
4. Create stakeholder groups and other user input and feedback mechanisms</td><td>Responsible for tracking/doing
#1: Enterprise Systems, VPIT (some contributions may be needed from CTSSR, CCS, TLOS, SETI, NI&S, ITSO, ARC)
#2-4: Enterprise Systems</td></tr>
<tr><td rowspan="3">Task 4.1.1.1.2</td><td colspan="3">Provide a clearinghouse to encourage sharing of expertise and resources for software acquisition and development between different units on campus and establish and support liaisons across the university to ensure ongoing effective collaborations and partnerships as well as to facilitate appropriate and sustainable deployment of enterprise systems and services.</td></tr>
<tr><td>Responsible parties:
Enterprise Systems</td><td>Partners:
VPIT (ITA, Administration & Planning)
CCS</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. The development and implementation of a collaborative, social networking site for the campus that supports sharing information and facilitates partnerships for University central and non-central IT enterprise systems development organizations.</td><td>Responsible for tracking/doing
#1: Enterprise Systems</td></tr>
<tr><td rowspan="3">Task 4.1.1.1.3</td><td colspan="3">Develop, implement, or upgrade to contemporary enterprise applications that offer mobile device interfaces and address user expectations for improved ease of use while assessing security impacts and complexity of support.</td></tr>
<tr><td>Responsible parties:
Enterprise Systems
ITSO
CCS</td><td>Partners:
NI&S (4HELP)
CTSSR</td><td>Resources:
Additional support personnel and expertise (SharePoint online)</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Implement new applications and services that work on multiple platforms and provide new capabilities to the university community
2. Redesign myVT to be the unifying user experience in the contemporary Virginia Tech enterprise application environment
3. Enable VT Office 365 for services other than email, with initial focus on SharePoint</td><td>Responsible for tracking/doing
#1-2: Enterprise Systems, NI&S (4HELP)
#3: CCS</td></tr>
</table>

Area 1/Goal 1: High priority needs and effective use of resources

Initiative 2

Description

Collaboratively define, standardize, and communicate policies and procedures for the development, maintenance, and clarification of support for enterprise applications

2014-2016 Initiative 2 Tasks and Projects

<table>
<tr><td rowspan="3">Task 4.1.1.2.1</td><td colspan="3">Work with groups across campus to develop a standard definition of what does and does not constitute an enterprise application subject to enterprise policies and procedures</td></tr>
<tr><td>Responsible parties:
VPIT</td><td>Partners:
Internal Audit
Enterprise Systems</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Convene a working group charged with creating recommendations for categorizations and standards for developing, acquiring, and sourcing software that ranges in scope from unit-level to enterprise-level services and solutions.
2. Evaluate, revise, and approve recommendations from the working group.
3. Implement recommendations as approved.</td><td>Responsible for tracking/doing
#1. Enterprise Systems
#2. VPIT and other VT executive leadership
#3. Enterprise Systems</td></tr>
<tr><td rowspan="3">Task 4.1.1.2.2</td><td colspan="3">Actively promote and advance knowledge of existing policies and procedures to groups outside of central IT, especially related to project management obligations</td></tr>
<tr><td>Responsible parties:
VPIT</td><td>Partners:
Internal Audit
Enterprise Systems</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Document, make available, and maintain a list of existing requirements
2. Implement processes for recording university enterprise projects, both central and non-central, that demonstrate effective utilization of project management standards.</td><td>Responsible for tracking/doing
#1-2: Enterprise Systems</td></tr>
<tr><td rowspan="3">Task 4.1.1.2.3</td><td colspan="3">Work with groups across campus to develop and implement additional policies and procedures as needed to achieve a clear and consistent environment for enterprise applications</td></tr>
<tr><td>Responsible parties:
Enterprise Systems
VPIT</td><td>Partners:
ITSO
CCS</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Develop a mechanism or process by which projects taken on by a unit or group could be considered for enterprise-level adoption
2. Work with groups on campus to create policies and procedures specifically focused on security, compliance, and maintenance requirements for applications outside of central IT
3. Implementation of policies and procedures from #2</td><td>Responsible for tracking/doing
#1-3: Enterprise Systems</td></tr>
</table>

Area 1/Goal 2: Exemplary enterprise systems, applications, and data

Initiative 3

Description

Provide the Virginia Tech community with tools and support to access and analyze information at their own level of expertise to meet their specific needs and requirements

2014-2016 Initiative 3 Tasks and Projects

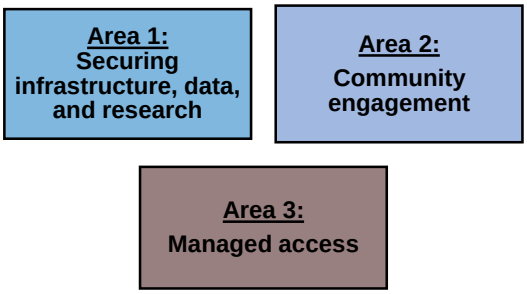
<table>
<tr><td rowspan="3">Task 4.1.2.3.1</td><td colspan="3">Implement an enterprise-wide business intelligence solution that delivers data analytics across diverse information sources, thus providing insights to inform university decision making</td></tr>
<tr><td>Responsible parties:
Enterprise Systems
University Data Initiative Project Teams</td><td>Partners:
BIS Stakeholders
NI&S (Systems Support, 4HELP)
CTSSR (IMS)</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Successful completion of the BIS Implementation project for MicroStrategy and the SPOT (Student Perception of Teaching) system
2. The collaborative creation of access mechanisms and structures to support the MicroStrategy SPOT implementation
3. Implementation of a self-service model for the business intelligence solution that documents and supports data usage and analysis customized to individual needs within the VT community.
4. Creation of a long-term roadmap for the business intelligence solution that supports continued expansion of the system beyond the initial implementation.
5. Develop or provide training and other orientation opportunities to help groups across campus (e.g., Provost, Finance, CIDER, departments, Assessment, Institutional Research) understand how the BIS can help VT learn from the information it makes available</td><td>Responsible for tracking/doing
#1: BIS Implementation Project Team
#2: BIS Implementation Project Team, CTSSR (IMS)
#3: Enterprise Systems, TLOS
#4: BIS Implementation Project team
#5: BIS Implementation Project team & TLOS (NLI & NKE & NLDS)</td></tr>
<tr><td rowspan="3">Task 4.1.2.3.2</td><td colspan="3">Leverage the implementation of the new business intelligence system to establish data governance and data modeling practices that provide appropriate and secure access while expanding information availability, value, and usage in existing and emerging applications.</td></tr>
<tr><td>Responsible parties:
Data stewards
University Data Initiative Project Teams
VPIT</td><td>Partners:
Enterprise Systems
ITSO
CTSSR (IMS)</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Compilation of recommendations for university data governance procedures and practices as determined by the University Wide Information Governance project team
2. Review, revision, and approval of recommendations submitted by the University Wide Information Governance project team
3. Implementation of recommendations as approved and prioritized</td><td>Responsible for tracking/doing
#1. University Wide Information Governance project team
#2. VPIT and other VT executive leadership
#3. Enterprise Systems, CTSSR (IMS), and university data stakeholders</td></tr>
</table>

Area 2/Goal 3: Efficiencies, innovation, and effectiveness			
Initiative 4			
Description			
Seek opportunities to continuously improve how Virginia Tech acquires and structures enterprise applications, systems, and services.			
2014-2016 Initiative 4 Tasks and Projects			
Task 4.2.3.4.1	**Design a strategy and process for alternative sourcing of enterprise systems and services including administration, compliance, contract management, and integration of multi-sourced services, and maintain a focus on innovation for those systems and services that offer competitive advantage.**		
	Responsible parties: Enterprise Systems	Partners: University stakeholders NI&S VPIT (ITA)	Resources:
	Demonstration of Progress and Deliverables: 1. The development and implementation of defined inventory, evaluation, integration, and implementation processes for potential new services or vendors 2. Create a roadmap for the future directions of Virginia Tech enterprise systems for the next 5 to 10 years taking into consideration Ellucian's roadmap for the future of the Banner system.		Responsible for tracking/doing #1-2: Enterprise Systems

Pillar 5: Ensuring the Security and Resilience of Information Technology Resources

Strategic Areas

Pillar 5 of the IT Strategic Plan supports the security and resilience of IT resources. Safety and security encompass the protection and control of identities and physical spaces, as well as the safekeeping of networked information and resources that are the focus of Pillar 5. Indeed, IT at Virginia Tech often serves as a hub for the university to coordinate cybersecurity and efforts related to information technology risk assessment, disaster recovery, and continuation of operation. Data privacy and integrity in particular are increasingly important due to laws, policies and regulations, increasing requirements associated with sponsored research projects, and the growing number and sophistication of cyber-attacks.Therefore, Pillar 5 focuses specifically on the protection of these networked data and resources in IT's role as a security hub in three major strategic areas: securing our infrastructure, data, and research; engaging the community in actively protecting these resources; and in managing access to these resources.



Major Goals

The major goals for each area are as follows:

Area 1: Securing infrastructure, data, and research

- Goal 1: Establishing a level of security that continuously protects and ensures the resilience of university infrastructure, data, and research

Area 2: Community engagement

- Goal 2: Actively engage the Virginia Tech community in ensuring and improving IT security through research collaborations, education programs, and deliberate community outreach

Area 3: Managed access

- Goal 3: Enhance Virginia Tech's ability to effectively and efficiently manage access to institutional data and services

Key Initiatives/Strategies

Seven key initiatives, listed below by goal, will be the focus of Pillar 5 for 2014-2016.

Area 1/Goal 1: Protecting infrastructure, data, and research

- I1: Create an overarching 24/7 information technology security strategy based on defense-in-depth that includes robust standards, practices, policies, and controls
- I2: Help the university community identify and mitigate risks due to internal and external threats to its critical infrastructure and data assets in new and more thorough ways
- I3: Proactively take steps to provide effective threat defense and minimize disruptions and failures in information technology infrastructure, data, and services
- I4: Improve recoverability and resilience of IT infrastructure and data

Area 2/Goal 2: Research, education, and outreach

- I5: Engage in innovative cybersecurity research that strives to advance capabilities and that is synergistic with related academic programs
- I6: Devise and implement new methods of education, training, and community outreach that create opportunities for interaction and conversation between IT security personnel and Virginia Tech faculty, students, staff, and the broader community

Area 3/Goal 3: Managed access

- I7: Advance IT's identity management capabilities to ensure a comprehensive strategy for managing secure access to university facilities, services, and online systems.

Area 1/Goal 1: Protecting infrastructure, data, and research

Initiative 1

Description

Create an overarching 24/7 information technology security strategy based on defense-in-depth that includes robust standards, practices, policies, and controls

2014-2016 Initiative 1 Tasks and Projects

<table>
<tr><td rowspan="3">Task 5.1.1.1.1</td><td colspan="3">Begin structured implementation and monitoring of the 20 critical security controls (CSC) for effective cyber defense for best-effort compliance with institutional, federal, and international security standards</td></tr>
<tr><td>Responsible parties:
ITSO
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, NI&S, SETI, TLOS, VPIT)</td><td>Partners:
Units and departments across campus</td><td>Resources:
Additional personnel and funding for tools may be needed to implement these controls</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Perform an annual gap analysis to measure implementation progress of the 20 controls for central IT
2. Develop operational and tactical plans to implement each critical control
a. Controls slated for implementation and monitoring (with planned metrics) for this Operational Plan may include: secure configurations for hardware and software; continuous vulnerability assessment and remediation; malware defences; security skills assessment; application software security; limitation and control of server ports, protocols, and services; controlled use of admin privileges; boundary defense; incident response capabilities
3. Develop a method to accurately assess progress on the controls (possibly using metrics on the controls)
4. Implement training or outreach events to make the VT community aware of the controls and help units develop a strategy based on these controls</td><td>Responsible for tracking/doing
#1-4: ITSO</td></tr>
<tr><td rowspan="3">Task 5.1.1.1.2</td><td colspan="3">Provide Virginia Tech data trustees and custodians with the tools and knowledge to fulfill their roles and responsibilities in ensuring the privacy and integrity of sensitive university data.</td></tr>
<tr><td>Responsible parties:
ITSO
VPIT
Enterprise Systems</td><td>Partners:
VPIT (ITA)
CTSSR (IMS)
NI&S (4HELP)</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. In collaboration with data trustees, create data classifications to help guide protection and management of data
2. Review IT policies and standards to ensure consistency with current organizational structures and best practices
3. Create and/or procure and distribute tools and training exercises to encourage appropriate protection of data
4. Assess, to the extent feasible, the extent to which best practices are observed</td><td>Responsible for tracking/doing
#1-2: VPIT, Enterprise Systems and ITSO
#3: ITSO
#4: Enterprise Systems, ITSO</td></tr>
<tr><td rowspan="3">Task 5.1.1.1.3</td><td colspan="3">Converge and integrate IT security resources into a security operations capability</td></tr>
<tr><td>Responsible parties:
ITSO
NI&S</td><td>Partners:
University stakeholders</td><td>Resources:
Potentially some equipment and staff training</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Plan and deploy a security operation capability that supports monitoring and alarms at the Network Operations Center (NOC) and in the ITSO
2. Develop procedures and protocols for integrating the security operations capability into existing NOC and other support functions</td><td>Responsible for tracking/doing
#1: ITSO and NI&S
#2: ITSO and NI&S</td></tr>
<tr><td rowspan="3">Task 5.1.1.1.4</td><td colspan="3">Build awareness about guidelines and policies for securing devices and provide tools to assist.</td></tr>
<tr><td>Responsible parties:
ITSO</td><td>Partners:
TLOS (NLI and NKE)</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Recommend and/or develop tools to assist users with device security
2. Implement awareness-building exercises for existing policies and standards</td><td>Responsible for tracking/doing
#1: ITSO
#2: ITSO and TLOS (NLI and NKE)</td></tr>
</table>

Area 1/Goal 1: Protecting infrastructure, data, and research

Initiative 2

Description

Help the university community identify and mitigate risks due to internal and external threats to its critical infrastructure and data assets

2014-2016 Initiative 2 Tasks and Projects

<table>
<tr><td rowspan="3">Task 5.1.1.2.1</td><td colspan="3">Maintain and promote the IT Risk Assessment process and ensure that it adheres to standards and best practices</td></tr>
<tr><td>Responsible parties:
CTSSR</td><td>Partners:
Units across campus</td><td>Resources:
Personnel resources to conduct additional training</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Number of IT risk assessments submitted
2. Number of training events conducted
3. Review and update IT risk assessment policies and procedures to clarify the risk assessment process and ownership of the process</td><td>Responsible for tracking/doing
#1-2: CTSSR
#3: CTSSR, ITSO, and VPIT</td></tr>
<tr><td rowspan="3">Task 5.1.1.2.2</td><td colspan="3">Expand security reviews and increase consulting assistance to increase awareness and improve risk identification capabilities</td></tr>
<tr><td>Responsible parties:
ITSO</td><td>Partners:
CTSSR
Units across campus</td><td>Resources:
Personnel resources to conduct additional security reviews; funding to purchase additional tools/equipment</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Clarify and emphasize to colleges and departments their responsibilities in the areas of data and systems security and partner with them to aid them in realizing their responsibilities
2. Implement a mandatory recurring security review process for systems opting to use the Restricted Limited Access Network (RLAN)
3. Better coordinate optional and mandatory security reviews with the IT risk assessment process between ITSO and CTSSR, especially to notify CTSSR of units lacking IT risk assessments</td><td>Responsible for tracking/doing
#1-2: ITSO
#3: ITSO and CTSSR</td></tr>
</table>

Area 1/Goal 1: Protecting infrastructure, data, and research			
Initiative 3			
Description			
Proactively take steps to provide effective threat defense and minimize disruptions and failures in information technology infrastructure, data, and services			
2014-2016 Initiative 3 Tasks and Projects			
Task 5.1.1.3.1	**Improve identification and mitigation of threats to Virginia Tech IT assets by expanding IT monitoring capabilities of cyber threats to university information technology resources**		
	Responsible parties: ITSO	Partners: CTSSR Administrative and academic units SETI NI&S CCS	Resources:
	Demonstration of Progress and Deliverables: 1. Monitor and adapt as needed the newly installed sensors in the National Capital Region 2. Increase scope and penetration of vulnerability scanning and port checks		Responsible for tracking/doing #1-2: ITSO
Task 5.1.1.3.2	**Plan and assist groups across campus with the implementation of risk prevention measures that balance the need for openness with the need for security to provide an acceptable level of risk; adapt to new dependencies; new threats; and new laws, policies, and regulations**		
	Responsible parties: ITSO	Partners: Units across campus NI&S SETI CCS CTSSR	Resources:
	Demonstration of Progress and Deliverables: 1. Reduce vulnerabilities through effective patch management 2. Test and evaluate enterprise data protection and data access controls and strategies		Responsible for tracking/doing #1-2: ITSO

Area 1/Goal 1: Protecting infrastructure, data, and research			
Initiative 4			
Description			
Improve recoverability and resilience of IT infrastructure and data			
2014-2016 Initiative 4 Tasks and Projects			
Task 5.1.1.4.1	**Work with university stakeholders to improve resilience and recoverability of critical IT systems for all Virginia Tech campuses**		
	Responsible parties: VPIT NI&S Enterprise Systems	Partners: Units across campus CCS CTSSR	Resources: Additional funding and staff time
	Demonstration of Progress and Deliverables: 1. Complete efforts to improve redundancy in the university's directory infrastructure, including appropriate mechanisms for the Enterprise Directory and Active Directory infrastructures 2. Complete plans and implement a backup facility that duplicates crucial systems and data for a more robust and resilient environment. 3. Assist with the development of improved systems documentation for non-central IT groups		Responsible for tracking/doing #1: CCS, SETI, CTSSR #2: NI&S, CCS, VPIT, Enterprise Systems #3: CTSSR
Task 5.1.1.4.2	**Enhance central IT-specific disaster recovery and IT Continuity Of Operations (COOP) planning to improve IT emergency preparedness.**		
	Responsible parties: All units in the IT organization	Partners: OEM	Resources:
	Demonstration of Progress and Deliverables: 1. Develop and clearly articulate priorities for IT disaster recovery and IT COOP 2. Enhance disaster recovery and COOP tools and demonstrate that they are updated annually and compliant with university and state requirements 3. Initiate and coordinate COOP drills for the IT organization to test responses in the event of an emergency		Responsible for tracking/doing #1: CTSSR #2: CTSSR #3: CTSSR, All units in the IT organization
Task 5.1.1.4.3	**Advance Virginia Tech's ability to respond to and recover from cyber-attacks**		
	Primary parties: ITSO	Partners: Units across campus	Resources:
	Demonstration of Progress and Deliverables: 1. Share and disseminate information on cyber-attacks with affected or targeted groups 2. Develop methods and tools to share real-time threat information 3. Develop or procure training opportunities on cyber security to enhance security 4. Develop and maintain enterprise-wide responses to cyber-attacks		Responsible for tracking/doing #1-4: ITSO

<table>
<tr><th colspan="4">Area 2/Goal 2: Research, education, and outreach</th></tr>
<tr><th colspan="4">Initiative 5</th></tr>
<tr><th colspan="4">Description</th></tr>
<tr><td colspan="4">Engage in innovative cybersecurity research that strives to advance capabilities and that is synergistic with related academic programs</td></tr>
<tr><th colspan="4">2014-2016 Initiative 5 Tasks and Projects</th></tr>
<tr><td rowspan="3">Task 5.2.2.5.1</td><td colspan="3">Increase researcher participation in and use of the ITSO research lab and security data to spur innovation and foster a sense of ownership over personal and institutional cybersecurity</td></tr>
<tr><td>Responsible parties:
ITSO</td><td>Partners:
University research partners
VTIP</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Usage rates of real-time data provided by ITSO to researchers
2. New patents or use/adoption rate by others of items in other patents</td><td>Responsible for tracking/doing
#1-2: ITSO</td></tr>
<tr><td rowspan="3">Task 5.2.2.5.2</td><td colspan="3">Increase student participation in and use of the ITSO research lab and security data to develop skills, fill ITSO employment needs, and help to impact the national need for trained cybersecurity professionals</td></tr>
<tr><td>Responsible parties:
ITSO</td><td>Partners:
University academic partners</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Implement a marketing and publicity campaign internal and external to the university as a recruitment tool, especially for the Scholarship for Service program
2. Number of students working in the lab and/or doing doctoral/master’s research with the lab and number who complete degree programs</td><td>Responsible for tracking/doing
#1-2: ITSO</td></tr>
<tr><td rowspan="3">Task 5.2.2.5.3</td><td colspan="3">Work with researchers on IT security-related grant acquisition and completion</td></tr>
<tr><td>Responsible parties:
ITSO</td><td>Partners:
University research partners</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Number and types of grant applications, successful applications, current grant projects
2. Number of papers or presentations created in conjunction with researchers and students</td><td>Responsible for tracking/doing
#1-2: ITSO</td></tr>
</table>

Area 2/Goal 2: Research, education, and outreach			
Initiative 6			
Description			
Devise and implement new methods of education, training, and community outreach that create opportunities for interaction and conversation between IT security personnel and Virginia Tech faculty, students, staff, and the broader community			
2014-2016 Initiative 6 Tasks and Projects			
Task 5.2.2.6.1	**Work with university units to integrate cybersecurity practices into all university processes.**		
	Responsible parties: ITSO	Partners: Units across campus	Resources:
	Demonstration of Progress and Deliverables: 1. Positive or improved security review outcomes 2. Drop in number of infections 3. Levels of encryption across campus		Responsible for tracking/doing #1-3: ITSO
Task 5.2.2.6.2	**Expand the audience for cybersecurity by increasing the number or scope of educational outreach and training activities via guest lectures, participation in or teaching of IT-related courses, attendance at department and faculty meetings, student orientation talks, participation in events like GobblerFest, etc.**		
	Responsible parties: ITSO	Partners: TLOS (NetPed)	Resources:
	Demonstration of Progress and Deliverables: 1. Document participation in areas such as: a. ITSO personnel taught courses (e.g., ECE5585 and ECE4560), new employee security awareness trainings, SANS courses, annual IT security trainings, conference presentations/participation, educational use of ITSO data, academic class guest lectures 2. Create and document participation in new training initiatives (e.g., systems administration trainings)		Responsible for tracking/doing #1-2: ITSO
Task 5.2.2.6.3	**Continue existing and seek new partnerships on cybersecurity that extend beyond the borders of Virginia Tech with other institutions, businesses, and/or non-profits (e.g., SANS, VA Scan, US Cyber Challenge, EDUCAUSE, and others)**		
	Responsible parties: ITSO	Partners:	Resources:
	Demonstration of Progress and Deliverables: 1. Document external partnerships with ITSO		Responsible for tracking/doing #1: ITSO

Area 3/Goal 3: Advanced identity management

Initiative 7

Description

Advance IT's identity management capabilities to ensure a comprehensive strategy for managing secure access to university facilities, services, and online systems.

2014-2016 Initiative 7 Tasks and Projects

Task 5.3.3.7.1	**Ascertain standards/best practices and implement capabilities in identity management that meet the needs of the institution or broader community.**		
	Responsible parties: CTSSR (IMS) SETI	Partners: TLOS (NKCS and NLDS) ITSO CCS NI&S	Resources: Significant personnel infusion to ameliorate capacity challenges would be needed
	Demonstration of Progress and Deliverables: 1. Monitor and adopt as appropriate best practices, services/offerings emerging from groups such as Internet2, InCommon, FIDO Alliance (Current examples: Eduroam, LARPP, UApprove, CommIT, CIFER, Multi-Context Broker, Social-to-SAML Gateway). 2. Increase the use of federated credentials where appropriate. 3. Investigate best practices with regard to remote identity verification processes for online students. 4. Analyze requirements for responding to changes in the identity environment created by the proliferation of cloud services and mobile devices. a. Identify strategies for bridging identities between cloud and on-premise services. b. Design an authentication/authorization service for native applications on mobile platforms. c. Monitor Internet2 Net+ cloud service offerings and recommend adoption if appropriate/feasible.		Responsible for tracking/doing #1-2: CTSSR (IMS), SETI, NI&S #3: CTSSR (IMS), TLOS, and SETI #4a – b: CTSSR (IMS) #4c: CTSSR (IMS), SETI, NI&S
Task 5.3.3.7.2	**Work across campus to develop a common vision and improve interoperability for identity management functions, including university policies and procedures, vendor requirements and software compatibility guidelines for all IT departments.**		
	Responsible parties: CTSSR (IMS)	Partners: CCS SETI University stakeholders ITSO TLOS (NKCS) NI&S Enterprise Systems	Resources:
	Demonstration of Progress and Deliverables: 1. Create and provide ongoing documentation that maps services to credentials. 2. Work with identity stakeholders to improve unification of identity policies, procedures and direction. 3. Establish liaison groups for dissemination of identity information and to receive feedback/input from users of identity services. 4. Collaborate with groups across campus to create a consistent view of identities for physical and virtual access. 5. Provision from the identity management system to VT's Learning Management System as appropriate. 6. Address interoperability issues associated with the purchase of systems.		Responsible for tracking/doing #1: CTSSR (IMS), SETI, CCS #2: VPIT, ITSO, and CTSSR (IMS) #3: CTSSR (IMS), Enterprise Systems, ITSO #4: CTSSR (IMS), VPAS facilities and space mgmt., University stakeholders, Hokie Passport, SETI #5: CTSSR (IMS), TLOS, SETI #6: CTSSR (IMS), SETI, CCS, Enterprise Systems, VPIT
Task 5.3.3.7.3	**Investigate and evaluate options for multi-factor and other credentialing technologies in response to the critical needs budget request (funded or unfunded).**		
	Responsible parties: SETI CTSSR (IMS)	Partners: ITSO NI&S (4HELP) CCS Enterprise Systems	Resources: Requires additional personnel and possibly hardware, software, or service resources.

<table>
<tr><td></td><td colspan="2">Demonstration of Progress and Deliverables:
1. Evaluate multifactor credential solutions and recommend appropriate solutions for Virginia Tech.
2. Identify university data, applications and roles that may require higher levels of identity assurance and recommend appropriate solutions.
3. Enhance CAS and Shibboleth support for multi-factor credentials.</td><td>Responsible for tracking/doing
#1: SETI, CTSSR (IMS), ITSO
#2-3: SETI, CTSSR (IMS)</td></tr>
<tr><td rowspan="3">Task 5.3.3.7.4</td><td colspan="3">Improve the experience of temporary/transient students, guests and affiliates at Virginia Tech via more streamlined and rapid provisioning and deprovisioning of access to technology resources.</td></tr>
<tr><td>Responsible parties:
CTSSR (IMS)</td><td>Partners:
NI&S
SETI
CCS
Enterprise Systems (keep informed)</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Identify new means of providing multiple levels of guest access to resources that can be provisioned or deprovisioned on demand and selectively implement as feasible.
2. Create distributed registration authorities to allow university units/administrators to manage non-core identities that come under their purview.
3. Create an Affiliate System including a Business Process Management/Modeling (BPM) engine.
4. Create more flexible identity management processes for enabling timely and appropriate access for non-core Virginia Tech individuals (e.g., program participants, research collaborators, emergency personnel).</td><td>Responsible for tracking/doing
#1: CTSSR (IMS) and SETI
#2-3: CTSSR (IMS)
#4: CTSSR (IMS) and SETI</td></tr>
<tr><td rowspan="3">Task 5.3.3.7.5</td><td colspan="3">Continue to strengthen the security and privacy of the Identity Management Infrastructure</td></tr>
<tr><td>Responsible parties:
CTSSR (IMS)
SETI
ITSO</td><td>Partners:
VPIT
CCS</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Determine whether to provide a method that allows end users to electronically consent to release their attributes to federated services
2. Increase PID compliance with InCommon Silver criteria
3. Increase security of PID passwords stored in the Enterprise Directory
4. Streamline the process of obtaining an ED-Id service and client certificate to secure ED-Auth
5. Extend the trust for personal digital certificates to external authorities
6. Implement capability for student invisibility in People Search independent from “confidentiality” flag</td><td>Responsible for tracking/doing
#1: CTSSR (IMS), SETI, VPIT, CCS
#2: CTSSR (IMS), SETI
#3: SETI
#4: SETI, CTSSR (IMS)
#5: SETI, CTSSR (IMS), VPIT
#6: CTSSR (IMS), SETI</td></tr>
</table>

Pillar 6: Improving Communications with Customers and Partners

Strategic Areas

Pillar 6 focuses on IT's desire to improve communications with customers and partners within and outside of Virginita Tech. Work in Pillar 6 for 2014-2016 will occur in one overarching area: retooling the IT organization's approach to communications work with the intention to promote multi-directional information sharing and partnership.

Area 1: Retooling

Major Goals

The major goal is as follows:

Area 1: Retooling

- Goal 1: The IT organization will focus on communication as a strategic lever to enhance connectivity in the networked university and will expand communications efforts within IT, with the university community, and with a broad range of internal and external partners and potential partners

Key Initiatives/Strategies

Three key initiatives, listed below by goal, will be the focus of Pillar 6 for 2014-2016.

Goal 1: Communication as a strategic lever

- I1: Promote a culture of information sharing within the IT organization.
- I2: Develop and implement a plan to actively engage our communities.
- I3: Build awareness of the activities and accomplishments of the Information Technology organization to increase internal and external partnerships.

<table>
<tr><th colspan="4">Area 1/Goal 1: Communication as a strategic lever</th></tr>
<tr><th colspan="4">Initiative 1</th></tr>
<tr><th colspan="4">Description</th></tr>
<tr><td colspan="4">Promote a culture of information sharing within the IT organization.</td></tr>
<tr><th colspan="4">2014-2016 Initiative 1 Tasks and Projects</th></tr>
<tr><td rowspan="3">Task 6.1.1.1.1</td><td colspan="3">Develop and implement a comprehensive communication approach that recognizes that all IT groups need to play a role in communication and considers the broad range of communication needs.</td></tr>
<tr><td colspan="2"><u>Responsible parties:</u>
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)
<u>Partners:</u></td><td><u>Resources:</u>
Dedicated personnel capacity for central communications work</td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Inventory and evaluate the existing communications processes, venues, and mechanisms for sharing information within and across organizational boundaries
2. Develop and implement a high level perspective, plan, and operational approach for communications in IT
3. Establish a communications team where each member has job responsibilities dedicated to the communications process.</td><td><u>Responsible for tracking/doing</u>
#1-2: VPIT, Communications Team, ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS
#3: VPIT and Communications team with contributions from all IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS)</td></tr>
<tr><td rowspan="3">Task 6.1.1.1.2</td><td colspan="3">Build relationships throughout the IT organization.</td></tr>
<tr><td colspan="2"><u>Responsible parties:</u>
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT/Communications team)
<u>Partners:</u></td><td><u>Resources:</u></td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Promote involvement of colleagues throughout the organization in plans and projects, as well as in recognition of work achievements and recognitions
a. Continue VPIT meetings with each IT group and share visit schedule
b. Hold an annual or bi-annual all-hands meeting for the IT organization’s employees
c. Develop opportunities to share strategic successes, celebrate milestones, discuss lessons learned, share failures, advertise tools found highly useful or tools created, and discuss skills essential for an effort’s success
d. Create a social media platform for the IT organization to share information on projects, interests, research, etc.</td><td><u>Responsible for tracking/doing</u>
#1: VPIT/Communications team with contributions from all IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS)</td></tr>
</table>

Area 1/Goal 1: Communication as a strategic lever

Initiative 2

Description

Develop and implement a plan to actively engage our communities.

2014-2016 Initiative 2 Tasks and Projects

Task 6.1.1.2.1

Develop and implement a portfolio of ongoing strategies and processes to actively listen to, seek input from, and build awareness of people, protocols, and units outside the IT organization.

Responsible parties:	Partners:	Resources:
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)		Training as needed to enable IT personnel to effectively engage in these activities

Demonstration of Progress and Deliverables:	Responsible for tracking/doing
1. Develop an approach to solicit regular, structured feedback from the university community that avoids overwhelming clients with input requests, ensures that feedback requests are based on clear goals with anticipated outcomes, and requires that information from these interactions is shared within the IT organization a. Develop an effective strategy for leveraging qualitative input b. Prepare for, enlist appropriate parties to help create, and administer a survey plan for the university community assessing satisfaction with Information Technology services 2. Review current utilization of advisory groups; identify gaps, roles, and charters; and work to address identified gaps 3. Evaluate and improve interactive communication with multiple segments of the university and establish plans to engage particular audiences based on the strategic need of each IT group	#1: VPIT/Communications Team with contributions from all IT groups #2-3: VPIT, ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, with contributions from the Communications Team as needed

Task 6.1.1.2.2

Make information about Information Technology services and plans readily available.

Responsible parties:	Partners:	Resources:
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)		Additional resources needed for designing and maintaining web content

Demonstration of Progress and Deliverables:	Responsible for tracking/doing
1. Develop a vision for the IT web presence and articulate an approach to achieve a more consistent and real-time web presence. As part of this approach, define what makes sense to standardize across the IT organization and who is responsible for working to achieve the required standards 2. Enhance communications processes from IT to the university community a. Create streamlined resources and references for the university community b. Develop routing mechanisms across all of IT to leverage opportunities for collaboration between groups and improve service for individuals that contact one area of the IT organization and could benefit from discussion with another IT group c. Identify the multiple audiences for IT communications and appropriate contact mechanisms d. Define or describe how to appropriately consider audience and purpose as a first step in all communications campaigns and messages (when everyone should get a message, when people should opt-in to messages, etc.) e. Improve the process for announcing and publicizing service outages f. Develop automated processes for monitoring, testing, and publicizing information on systems and services performance	#1-2: VPIT/Communications team with contributions from all IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS)

Area 1/Goal 1: Communication as a strategic lever			
Initiative 3			
Description			
Build awareness of the activities and accomplishments of the Information Technology organization to increase internal and external partnerships.			
2014-2016 Initiative 3 Tasks and Projects			
Task 6.1.1.3.1	**Raise awareness of the IT organization through targeted events.**		
	Responsible parties: All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)	Partners:	Resources: Additional staff resources are needed to support the completion of these activities, possibly in a new role
	Demonstration of Progress and Deliverables: 1. Host showcases and roadshows, possibly in partnership with other groups at the university, that are carefully tailored to particular audiences, including: a. Grant program showcases b. IT roadshows for the colleges 2. Identify and take greater advantage of existing conferences and meetings at Virginia Tech to plug into groups where sharing information on IT might be helpful 3. Identify strategic external conferences at which to present and share information		Responsible for tracking/doing #1-3: VPIT with contributions from all IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS), assistance from Communications Team as needed

Pillar 7: Strengthening the Information Technology Organization

Strategic Areas

Pillar 7 focuses on making the IT organization stronger and more capable. Work in Pillar 7 for 2014-2016 will therefore occur in this main area--improving IT's organizational agility and effectiveness.

Area 1:
Agility and effectiveness

Major Goals

The major goals for are as follows:

Area 1: Agility and effectiveness

- Goal 1: Improve organization-wide understanding, planning, and documentation of IT services and activities
- Goal 2: Develop and maintain a workforce pipeline for the Information Technology organization

Key Initiatives/Strategies

Three key initiatives, listed below by goal, will be the focus of Pillar 7 for 2014-2016.

Area1/Goal 1: Understanding, planning, and documentation of IT services and activities

- I1: Create tools and processes to help the IT organization understand the services and activities that are taking place, identify the services and activities that should be in place in the future, and evaluate services and activities that should be retired.

Area1/Goal 2: Developing and maintaining a workforce pipeline

- I2: The IT organization will consider and implement new approaches to hiring and retaining a well-qualified and diverse workforce at all skill levels.
- I3: Deliberately create career opportunities and career planning mechanisms to cultivate technical experts, leaders, facilitators, and integrators within the IT organization to make IT an effective part of the networked university.

Area 1/Goal 1: Understanding, planning, and documentation of IT services and activities

Initiative 1

Description

Create tools and processes to help the IT organization understand the services and activities that are taking place, identify the services and activities that should be in place in the future, and evaluate services and activities that should be retired.

2014-2016 Initiative 1 Tasks and Projects

Task 7.1.1.1.1	**Develop and maintain a comprehensive portfolio of IT services and activities and implement routine need analysis and evaluation of opportunities to sunset work.**		
	Responsible parties: All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)	Partners:	Resources:
	Demonstration of Progress and Deliverables: 1. The creation of an IT portfolio with tiered views that allows for highly detailed internal access to information and more limited access to non-IT groups and individuals a. Provide clear information on where to go for assistance with services and activities b. Develop a process for mapping service offerings to remote Virginia Tech locations c. Provide filterable and sortable functionality for multiple categories and include tagging or other identifiers of relationships to other groups, individuals, and activities 2. Evaluate on at least an annual basis: a. Service and activity gaps and needs b. Opportunities to sunset IT services and activities		Responsible for tracking/doing #1-2: All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)

Area 1/Goal 2: Developing and maintaining a workforce pipeline

Initiative 2

Description

The IT organization will consider and implement new approaches to hiring and retaining a well-qualified and diverse workforce at all skill levels.

2014-2016 Initiative 2 Tasks and Projects

<table>
<tr><td rowspan="2">Task 7.1.2.2.1</td><td colspan="3">Investigate and advocate for opportunities to achieve competitive salaries to attract and reward and retain talent in the IT organization, particularly in areas that are understaffed and/or facing severe capacity challenges.</td></tr>
<tr><td>Responsible parties:
VPIT</td><td>Partners:
CFO
HR
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS)</td><td>Resources:
Additional resources would be needed</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Conduct a holistic review of potential options for improvement, possibly by a third party that might include:
a. Assess impact of increasing new hire salaries that might create salary differentials/inequities for existing staff
b. Agree upon and publish a market goal for pay and make one-time adjustments for existing staff to meet this goal
c. Obtain benchmark data from HR for current and newly created positions based upon local/regional markets
d. Enhance the bonus program to reward staff and A/P faculty
e. Benchmark non-salary compensation incentives to reward staff or as part of general compensation
f. As noted in Task 7.1.2.2.4below, consider flexible work/teleworking arrangement opportunities as a retention mechanism
2. Examine recruiting and retention processes and strategies and address known IT organizational barriers to improvement in recruiting and retention, including:
a. Develop and target key recruiting “zones” (e.g., NCR)
b. Create a specific budget for IT personnel spending on recruitment, promotion, incentives, trainings, etc., and assign authority for management of this budget
c. Examine IT’s extant effort to meet affirmative action goals
d. Review IT practice for open job descriptions to determine whether minimum requirements vs. desired qualifications are appropriately tailored
e. Benchmark best practices/exemplars in these areas on campus (VTTI, VBI)
f. Understand current recruiting strategies and position advertising, including for students
g. Audit and document the process for hiring, funding, and onboarding of student workers across groups and seek opportunities to streamline the process at the central IT organization level
h. Assess IT working environments to determine whether physical spaces need adjustment to improve recruiting/retention
i. Create or define a streamlined process for exit interviews and structured current employee organizational feedback where IT designates a person or department to handle these (e.g., HR) and provide incentives to complete (e.g., an Amazon-like review tool)
i. Develop deliberate ways to include feedback and improvement opportunities in our processes and procedures and develop organizational understanding of where change is needed.
3. Develop metrics and reporting to determine progress in items 1 and 2 above</td><td>Responsible for tracking/doing
#1-3: VPIT in partnership with all IT groups</td></tr>
<tr><td rowspan="2">Task 7.1.2.2.2</td><td colspan="3">Increase the number of students who work in or with the Information Technology organization and enhance the employment pipeline by creating avenues for these students to consider post-college employment in IT at Virginia Tech.</td></tr>
<tr><td>Responsible parties:
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)</td><td>Partners:</td><td>Resources:</td></tr>
</table>

Area 1/Goal 2: Developing and maintaining a workforce pipeline

Initiative 2

	Demonstration of Progress and Deliverables: 1. Create a central IT entity dedicated to managing student engagement and employment and enable more robust data tracking and reporting capabilities on these employees a. Track the number of students working in IT and the areas in which they work b. Track the number of students who end up with VT IT jobs upon graduation c. Develop a skill registry to match student IT worker skills with existing IT job openings/needs 2. Implement the application process for graduate assistants on an organizational priority basis, consider mechanisms to partner with fellowship students 3. Reconstitute the student internship program using a centralized cohort model 4. Develop relationships with departments and groups on campus for partnership or recruiting opportunities 5. Send IT reps to the Virginia Tech career fairs 6. Seek opportunities to train and employ students in operational support 7. Establish student leaders across the IT organization to encourage recruitment of new students by students and knowledge transfer across student cohorts 8. Interview current student workers to determine why they are/are not applying for IT jobs at VT after graduation and apply exit interview process (task 7.1.1.1.1) to student employees	Responsible for tracking/doing #1-8: VPIT in partnership with all IT groups
Task 7.1.2.2.3	**Develop a standard expectation that IT will go above and beyond to foster a diverse and inclusive community that supports mutual respect.**	
	Responsible parties: All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)	Partners: / Resources:
	Demonstration of Progress and Deliverables: 1. Assess existing diversity or demographic profile of the IT workforce to understand current state 2. Support programs that enhance campus and workplace climate, safety, and community 3. Create a required process for departments to follow for each new recruiting effort to support diversity and inclusivity 4. Increase diversity training to improve cultural awareness and to foster a welcoming climate in the IT organization and at the university. 5. Develop metrics and reporting mechanisms to document and measure diversity over time within the IT organization 6. Develop a funding and strategic model for recruiting, particularly for improving the diversity of candidates 7. Promote the use of assistive and other technologies that enhance accessibility for the entire university community	Responsible for tracking/doing VPIT in partnership with all IT groups
Task 7.1.2.2.4	**Take steps to improve job satisfaction and flexible work opportunities in order to expand the pool of potential employees and improve retention of strong IT personnel.**	
	Responsible parties: All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)	Partners: / Resources:
	Demonstration of Progress and Deliverables: 1. Improve the experience of teleworking and supervising teleworkers, in part as a retention mechanism a. Offer technology training for supervisors and workers that includes tools and techniques for engaging and managing teleworkers in the on-campus office and meeting environment to promote excellence in teleworking b. Consider the creation of a cohort or focus group for teleworkers in IT to determine what is working well and what is not c. Consider the development of measures to help supervisors and staff determine whether teleworking is effective d. Include more information on teleworking vs. authorized closings, occasional remote work, etc., in IT's teleworking documentation e. Develop understanding across the IT organization about the purpose and value of teleworking from both a university and IT perspective f. Inventory and assess existing telework agreements and policies across the IT organization	Responsible for tracking/doing #1: VPIT in partnership with all IT groups

Area 1/Goal 2: Developing and maintaining a workforce pipeline

Initiative 3

Description

Deliberately create career opportunities and career planning mechanisms to cultivate technical experts, leaders, facilitators, and integrators within the IT organization to make IT an effective part of the networked university.

2014-2016 Initiative 3 Tasks and Projects

<table>
<tr><td rowspan="3">Task 7.1.2.3.1</td><td colspan="3">Enhance career planning within the IT organization.</td></tr>
<tr><td>Responsible parties:
VPIT</td><td>Partners:
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS)</td><td>Resources:</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Evaluate and document the anticipated skillsets that will be most needed in the IT organization moving forward
2. Connect career planning efforts with recruitment and retention efforts in Task 7.1.2.2.1
3. Consider the creation of common central IT career planning mechanisms, possibly in partnership with or guided by HR
a. Leverage this as an opportunity to create a strategy or approach for consulting on career pathways
b. Develop awareness within the IT organization of promotion and movement opportunities
4. Review HR policies and identify barriers to career advancement in IT
5. Create official mechanisms for leadership development through:
a. Develop management training for new IT leadership
b. University, Commonwealth, and external professional development opportunities
c. Developing mechanisms to help employees evaluate and identify mechanisms to address skill gaps for promotion
d. Developing career pathway planning and opportunities for wage personnel
e. Developing a mentoring framework for the IT organization including:
i. External leadership mentoring through existing affiliate organizations like EDUCAUSE
ii. Identifying appropriate IT organization personnel to act as professional mentors to IT employees and ensure that mentoring is recognized in annual performance reviews
iii. Different types of mentoring programs, approaches, and foci
iv. Creating an ongoing conversation about promoting mentoring</td><td>Responsible for tracking/doing
#1-5: VPIT in partnership with all IT groups</td></tr>
<tr><td rowspan="3">Task 7.1.2.3.2</td><td colspan="3">Encourage a culture where deliberate professional development and technical training are strategically funded and incentivized for IT employees and other IT professionals at VT.</td></tr>
<tr><td>Responsible parties:
VPIT</td><td>Partners:
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS)</td><td>Resources:
Additional funding and investment are needed to accomplish this task across the IT organization</td></tr>
<tr><td colspan="2">Demonstration of Progress and Deliverables:
1. Develop a deliberate training or professional development approach based on organizational needs
a. Create a dedicated central IT training fund to support relevant and justifiable professional development opportunities
b. Integrate the concept of team building into professional development considerations
c. Develop IT organization or HR capabilities to proactively help employees determine which skills they would like to develop and route them to appropriate opportunities
d. Consider cross-training or position documentation and broadly develop knowledge transfer capabilities
e. Create a forum for sharing professional development experiences, information, and suggestions
2. Continue and expand IT seminar opportunities to educate managers and staff about the broader university environment; the IT organization’s contribution and role; and hold cross-organizational seminars dedicated to providing information on activities and interests of both central and distributed IT</td><td>Responsible for tracking/doing
#1-3: VPIT in partnership with all IT groups</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">3. Demonstrate that the IT organization is offering appropriate technical training and professional development opportunities for its employees by utilizing internal resources, university programs, and external programs</td><td></td></tr>
<tr><td rowspan="3">Task 7.1.2.3.3</td><td colspan="3">Seek opportunities to optimize IT expertise and abilities across the IT organization.</td></tr>
<tr><td><u>Responsible parties:</u>
All IT groups (ARC, CCS, CTSSR, Enterprise Systems, ITSO, NI&S, SETI, TLOS, VPIT)</td><td><u>Partners:</u></td><td><u>Resources:</u></td></tr>
<tr><td colspan="2"><u>Demonstration of Progress and Deliverables:</u>
1. Leverage Tech Teams or test other formats as a mechanism for collaborative research and development
2. Develop stronger, formal development and test environments and resources for all of IT, particularly for vetting tools</td><td><u>Responsible for tracking/doing</u>
#1-2: VPIT in partnership with all IT groups</td></tr>
</table>