Promoting Innovation
Implementation Strategies and Updates

March 2014
**Promoting Innovation: Implementation Strategies and Updates**  
March 2014

Below are the recommendations and action items from *Promoting Innovation*, the University of Maryland’s IT strategic plan published in January 2013. Each action item has been analyzed, and an implementation strategy developed. These implementation strategies, along with progress updates as of March 2014, are included in this document.

**Recommendation 1: Information Technology Resources (Physical Infrastructure)**

The University of Maryland should build and maintain a sound, advanced, secure, and productive physical information technology infrastructure (including but not limited to facilities, hardware, networks, and software) capable of supporting broad and effective use by students, faculty, and staff throughout the institution, including remote university members such as agricultural extension offices.

**Action Item 1.1: Campus Data Centers**

The university must immediately review and address the need for data center/cyberinfrastructure facilities that are appropriately sized, powered (including backup power), and cooled to meet the needs of university-wide demands for such facilities.

*In today’s top tier research universities, the generation of new knowledge via the computing tools of simulation and visualization is greatly increasing (witness the design of new pharmaceuticals using computers), opening up new possibilities for those universities prepared to invest in the necessary large scale computing infrastructure. By many measures and in comparison with our national peers, Maryland does not have adequate and proper facilities for housing IT resources — in popular parlance, a data center. The lack of central data-housing facilities encourages the less-than-effective and cost inefficient development of distributed data center facilities in buildings across campus — in locations neither secured nor properly powered and cooled. This is a growing condition around campus, as decentralized efforts lead to scattered strategies in this regard. The lack of an appropriate facility hinders appropriate centralization of such resources and the opportunity to successfully leverage virtualized technologies (which would be more cost efficient); and this in turn increases the difficulty in the institution holistically evaluating and adopting successful cloud computing strategies (which may offer still greater cost efficiencies). The current primary data center facility also is not appropriately secured from a disaster or power outage — most of the institution’s key information and processing resources run without benefit of back-up generator coverage; and the primary data center is in a building that resides in a flood plain (and has, before, been flooded). This is perhaps the most fundamental and significant information technology issue facing UMD, with effects on the entire institution.*

**Category:** Baseline Fundamentals

**Implementation Strategy**

Consult Stakeholders

A university-wide IT infrastructure governance body will be developed that includes new or existing permanent representative bodies to oversee ongoing IT infrastructure resource management and university-wide best practices.
The Division of IT will lead an effort to inventory and catalogue all IT Data Center facilities available to the university community, and identify key elements such as “ownership,” size, lifespan, IT capacity, IT load, power usage, reliability/risk, and security. From a networking perspective, as the division develops the requirements for the data centers, port count and bandwidth growth targets can be reasonably accommodated with quarterly projections. Aggregate demand on current facilities will be assessed, and short-term, mid-term, and long-term demand will be projected. Short-term and mid-term plans will be developed to meet university-wide IT facility demand by maximizing efficient use of existing IT facilities. Factoring in current and projected demand, recommendations will be made to the Vice President of IT as to which IT facilities are worthy of short-term, mid-term, and long-term investment. The Division of IT will work with colleges who are interested in offloading data center resources to an available central facility. In conjunction with Action Item 1.7 (cloud computing) the role of these facilities will also be assessed to determine what functions, if any, may be best achieved through a cloud solution. In conjunction with Action Item 1.11 (sustainability), a resource consolidation model will be developed that maximizes university-wide power and cooling efficiency while recognizing and protecting the interests and needs of university units.

March 2014 Update

The Cyberinfrastructure Center became operational for colocation in January, 2014. The Division of IT leased vacant data center space near the M Square Research Park; 1,800 sq. ft. has been allocated for academic units to house their own equipment and 1,800 sq. ft. to the Deepthought2 HPC (High-Performance Computing Cluster). This space provides uninterruptable power supply (UPS) and generator service. It is remotely monitored 24/7. Please see www.it.umd.edu/cc for more information.

Action Item 1.2: Media Management

Address the university’s needs for equipment, infrastructure, and appropriate spaces for enhanced digital content (video, audio, graphics, etc.), including but not limited to video streaming, video capture and editing, and storage.

Higher education is experiencing a revolution in the use of digital content and multimedia to assist with pedagogy as well as for other administrative and marketing uses. The current central streaming media platform managed by the Division of IT is cumbersome to use and maintain and consequently those that need this type of service are looking to third-party tools (e.g., YouTube, Vimeo, etc.) to service their needs. While mainstream tools are easy to access and learn, a platform with the same ease of use that also provides the ability to secure content to specific audiences and integrates with other learning systems on campus is preferable. Potential solutions may well include use of commercial cloud offerings, either arranged for the enterprise or for individual consumption.

Category: Baseline Fundamentals
**Implementation Strategy**

**Identify/Garner Funding**

A project team has been formed to gather the requirements for a system that would better enable the use, storage, and archiving of digital media assets. The project team will also be charged with identifying the use and practice framework for this campus service. It will be necessary to substantiate this service with the appropriate governance priority to proceed and funding source to procure the system and supporting structures.

**March 2014 Update**

Requirements have been gathered and a statement of work drafted. Both have been sent to Procurement and an RFP will be issued early in 2014.

**Action Item 1.3: Digital Storage/File Sharing**

Provide a variety of cost effective options (including secure campus cloud or outsourced cloud) for on-demand digital storage with daily backups centrally managed and broadly accessible. This shall also include the capability for robust file sharing among campus constituents and their off-campus collaborators. This should also be tiered, providing solutions that meet needs ranging from pervasive pedestrian applications through advanced “big data” research.

Digital file storage and sharing at an enterprise level is a critical element needed for university community members to be able to collaborate not only on campus, but with outside partners as well. There is currently a continuum of solutions for file storage and sharing that includes local network drives and easily accessible cloud-based tools. The limitations of both inhibit achieving the flexibility, throughput, and security needed to support all constituents’ needs on campus. While publicly available cloud storage options are easily attained, security and policies must be put in place to ensure that sensitive data is protected. Public cloud storage solutions are not viable for research involving big data, nor are third-party apps efficient for managing files that never need to leave university systems. A combination of guidance for public storage use and more robust enterprise solutions will be developed to meet the demands of the university. Collaboration with higher education based service provider consortia, such as Internet2, may provide viable solutions in keeping with other strategic initiatives in this plan.

Categories: Baseline Fundamentals, Creating Abundance

**Implementation Strategy**

**Consult Stakeholders**

It will be necessary to assess the current environment to determine services that are presently offered at Maryland and which campus constituents have access to those services. Then, it will be necessary to identify gaps in service, outdated service approaches, and/or replicative services and adjust service offerings to meet the needs of the institution today and into the future.

**March 2014 Update**

A multi-tier Network Attached Storage infrastructure has been implemented, with a January 2014 increase in capacity that resulted in total available storage of 1 Petabyte across the Primary Data Center.
Box.com was implemented during the Fall 2013 semester, providing 25 GB of cloud storage, self-managed file sharing and collaboration for all UMD constituents. This service also allows for collaboration with people outside of the University of Maryland. Account storage was increased to 50 GB in January 2014.

Box organizational/group accounts, which can be administered and allocated by departments, were made available in January 2014.

A cloud storage management service for use in labs and selected classrooms is currently being tested. The service will allow users to access their cloud and local storage in a single interface, alleviating their need to carry files around to labs and classrooms.

**Action Item 1.4: Unified Communications**

**Provide tools that allow the university community to collaborate through unified communication.** While particularly critical for researchers, such tools will certainly have value to broader scholarly enablement and administrative effectiveness. Universal federated presence should be evaluated as part of such solutions and, depending upon community input, made available.

*Increasing numbers of institutions are offering unified communication (UC) tools for enterprise use, allowing collaboration through online chat, desktop sharing, video conferencing, and group conference calling. Whether students working on a group project, a teacher holding virtual office hours, or researchers working together, collaboration among the university user community inside and out will be enhanced by the use of a common suite of UC tools, by allowing more efficient and diverse communication mechanisms. Universal federated presence is the ability for an individual to provide information about their online status from any platform/device to communicate that more broadly to their contacts.*

*Category: Creating Abundance*

**Implementation Strategy**

The Division of IT is working to develop a Unified Communication Architecture that will provide an efficient, redundant, highly available, and flexible infrastructure that allows users to communicate and collaborate, utilizing diverse mechanisms from any location. The current infrastructure components, including end-user devices, and investment in technology are being analyzed to determine useful life, and where necessary, augmented or replaced to provide increased services to the entire campus. During CY13, best of breed systems will need to be chosen, funded, and implemented to fill the existing gaps in the current Unified Communications portfolio, such as: conferencing systems (audio, Web, and video) and enterprise instant messaging with federated presence capability. As Unified Communications is composed of multiple solutions and is constantly evolving, resources will be adjusted accordingly over both the short and long term. The Division of IT will seek input from the campus community in order to develop the road map and identify how to best prioritize and provide the needed Unified
Communications tools. This implementation will link directly with Action Item 1.10 (Federated Identity Management).

March 2014 Update

The Division of IT analyzed the current communications infrastructure and is in the process of determining the effectiveness and useful lifespan of each system. A survey was distributed and analyzed to determine priority and desire for new or enhanced Unified Communications tools. A Request for Proposal (RFP) has been issued to determine the various Unified Communications systems that will be implemented for the campus environment, with specific emphasis on core components, such as the phone system. The division has introduced new systems to the campus, including Adobe Connect for Web-based collaboration and UMD Conference Call Service for telephone conference-calling capabilities. Both are hosted by the division and are provided at no cost to faculty and staff.

Action Item 1.5: Network Refresh (1.5a) and MAX Refresh (1.5b)

A high-capacity, high-capability, advanced, and robust network infrastructure being crucial to the success of all IT enablement, the university will complete the ongoing Network Refresh Project. The Division of IT will continue to maintain the UMD network, balancing the ability to support the current IT landscape with stability and also to improve it as needed in support of the recommendations and action items put forth in this plan. Likewise, the Division of IT will continue its leadership role on behalf of the university in the Mid-Atlantic Crossroads (MAX), an innovative high-performance regional network, in support of research, education, and scientific discovery.

Since fall 2009, the university has been undergoing a planned five-year upgrade of its network infrastructure, which is creating the ability to have as large a conduit for digital throughput as any institution in the country. Currently, more than half of the buildings on campus have been completed, with many of those being the most complex with respect to the effort involved. Likewise, the core backbone for the entire network has been replaced, significantly speeding up network traffic across the entire campus. The Division of IT will analyze and revisit this investment in networking to ensure the appropriate mix of technology is being implemented based on university needs. When the project is complete, the Division of IT will ensure that continued enhancements are made to support the demands being placed on the network (especially in support of research) and that the university continues to be able to support the increased communications needs produced by implementation of this plan.

Category: Baseline Fundamentals

Implementation Strategy

No Predecessor Tasks

The Division of IT is on schedule to finish the initial phase of the Network Refresh in August 2014. The Network Refresh plan allows for a sustainable, robust network with funding, equipment life cycles, and campus participation through the Network Refresh Advisory Committee (NRAC). The division will continue to modernize current networks using input from the campus community including students, researchers, faculty, and staff.
The regional high-performance network – Mid-Atlantic Crossroads (MAX) – is being enhanced and refreshed in support of the high-performance needs of the campus and regional research community. The MAX network refresh will add to the already advanced 100 Gigabit/s Wavelength Division Multiplexing infrastructure similarly powerful Ethernet and IP layer services. To support the domain sciences requirements for better integration of big data, computation, and networking, the enhanced MAX network will also include Software Defined Networking features, embedded network storage capabilities, as well as high speed connections to a variety of external networks and resources. The MAX infrastructure and network serves as a platform for advanced cyber and networking service, research, and innovation. This expansive and powerful array of cyber infrastructure resources is available to campus researchers and their partners throughout the higher education research community. MAX is also the recipient of multiple research grants, which supports much of their advanced network research and innovation activities.

March 2014 Update

1.5a: Network Refresh
The Division of IT is still on schedule to finish the Network Refresh Project in August 2014. Efforts continue to upgrade the campus wireless network, data centers, and network core to support the latest technologies. Through the project, the division is now providing 1-Gbps connectivity to computer desktops in academic and administrative buildings, 100-Mbps connectivity to computer desktops in the dormitories, and 10-Gbps connectivity to the campus data centers and network core. The division recently assumed responsibilities for the campus cable network and initiated the replacement of the legacy analog head end/distribution system to a newer digital system. The fiber optic footprint continues expanding, connecting several local off-campus departments to our telephone and data networks. The division has initiated the Network Refresh of several buildings at the Shady Grove campus, as well as improved campus fiber redundancy and high bandwidth (10 Gbps) between the two campuses.

1.5b: MAX Refresh
The Division of IT continues to work on the refresh and upgrade of the Mid-Atlantic Crossroads (MAX) regional network. The MAX network connects federal, university, and corporate research laboratories in the Washington D.C. and Baltimore metropolitan areas to the high-performance research and education regional and national infrastructure. The MAX upgrade includes multiple 100-Gbps connections to the wide area network Internet2, upgrade of all eleven MAX Points of Presence (PoPs) to support 100-Gbps participant connections, new PoPs in the life sciences research corridor in Shady Grove, MD, and direct connect to Amazon Web Services. This network upgrade is on track to be completed by the end of the first quarter 2014. As a result of this network refresh, the MAX regional network will be one of the most advanced regional networks in the country.

Action Item 1.6: Wi-Fi and Cellular Coverage

Wireless connectivity will continue to grow as a critical communications infrastructure. Wi-Fi and cellular coverage must continue to be expanded and made more robust, and providers must be diversified over time. In support of this growth, the Division of IT should immediately convene a
group of students, faculty, and staff to get feedback on current issues, challenges, and successes of the existing wireless network.

With the propagation of wireless networking as part of the Network Refresh Project (see Action Item 1.5) the university’s wireless networks have become very heavily relied upon as a means to communicate and share data. Whether in the classroom, in the office, or at a sporting event, the near ubiquity of handheld devices with the ability to connect to Wi-Fi and cellular networks (e.g., phones, tablets, and laptops) have significantly increased the value proposition of wireless connectivity on campus. As the use of handheld devices grows, pockets of weak or no coverage as well as maximum capacity of the system in localized areas of extremely heavy use are being uncovered. The need for a fabric of wireless coverage that is pervasive over the entire campus and is able to balance the entire load being placed on it, even in areas of heavily concentrated use like large classrooms, is critical. The Division of IT will continue to assess patterns of use and engage its partners in providing wireless connectivity to enhance coverage so that the current and future demands of this growing digital environment are met. The Division of IT should also continue to evaluate and bring to the UMD wireless network enhancements such as eduroam (which was implemented in 2011) that facilitate broader global access to secured wireless networks.

Category: Baseline Fundamentals

Implementation Strategy

The Division of IT will charge the existing Network Refresh Advisory Committee NRAC to discuss current designs and roadmaps to enhance current systems. Then it will develop a plan to get faculty, staff, and student feedback on current and future designs. The division will also continue to engage the various campus groups such as the Student Affairs IT directors, Academic Affairs IT directors, and the UTCC as well as aim to be more inclusive by seeking out thoughts, concerns, guidance, needs, and/or perspectives from other groups on campus regarding the wireless solutions currently supported and new solutions coming.

Due to current usage and future mobility projections obtained from internal research and external investigations involving various campus entities, the division’s intention is to deploy higher-capacity Wi-Fi solutions with contiguous coverage to ensure ubiquitous continuity throughout the campus. The division continues to research the latest technologies (e.g. 802.11ac) leaning towards early adoption, but remaining mindful of premature release woes.

The division is also coordinating and collaborating in partnership with cellular service providers to improve cellular coverage. It is working with cellular vendors to increase their macro tower capacity, as well as to develop a plan to distribute cellular signals in all buildings. The division has completed its first test case of the Distributed Antenna System (DAS) in the Van Munching Hall. In addition, the division is working closely with the athletics department to expedite its own DAS solution. Improving cellular coverage is a complex process, because the service provisioning belongs to cellular providers and hinges on partnerships with vendors outside of the university.

March 2014 Update

- Wi-Fi Coverage
Network Refresh continues to improve wireless coverage in campus buildings by adding resources and improving designs of existing implementations.

The Division of IT has deployed approximately 300 of the latest generation (802.11ac) access points in several buildings. The newer access points provide 1.3 Gbps compared to the existing at 450 Mbps.

The division has concluded an outdoor wireless survey and design. Pending approval from the Facilities Council, the division will deploy 200 mesh access points providing more comprehensive campus coverage outside of the buildings.

- Cellular Coverage
  - The Division of IT has been working closely with our cellular vendors to improve coverage on campus.
    - Comcast Center – complete indoor coverage (Spring 2014)
    - Van Munching Hall – complete indoor coverage (Complete)
    - AT&T – installing new Macro Cell Sites (Spring 2014)
    - AT&T has surveyed more than 100 buildings and is in the process of design for an “Outdoor Distributive Antenna System.” This project will significantly improve cellular coverage throughout campus, installing hundreds of smaller antennas to distribute signal. (Winter 2014)

**Action Item 1.7: Guidelines for Cloud Services/Cost Reduction through Partnerships**

In recent years, the growth in network bandwidth has made it possible to take some computing burden (e.g., data storage and applications’ use of CPU and memory) off of the desktop by allowing services and applications to be attained through centrally hosted means. The university must develop a strategy and approach to the deployment and support of cloud-based computing, including infrastructure and hosted third-party application solutions. The strategy must include: 1) Support of the use of such services independently by community members, providing well-documented guidance to ensure the continued security, integrity, and privacy of the university IT environment and 2) Centralized offerings (e.g., email, storage, digital media, etc.) obtained by the Division of IT on behalf of the campus and supported in such a way as to address conditions of service unique to individual units or groups as far as is practical to ensure effective and productive use of such offerings. The Division of IT and the university community should evaluate the hybridization of public/private cloud offerings across the spectrum of IT infrastructure and services and determine appropriate paths toward use of such offerings.

The trend toward use of cloud-based solutions within the last three to five years has created a challenging continuum of opportunity and risk. Opportunities arise in the form of inexpensive (often free) services, platforms, applications, and collaboration environments all made available and provisioned through simple point and click configuration with a long menu of options that can often be tailored to exact specifications. For IT operations, cloud computing provides an opportunity to strategically evaluate outsourcing functions that have traditionally been maintained and operated internally, to achieve cost savings, and to better utilize existing resources. The risks presented by cloud computing are based on the same aspects as the opportunities presented. Because of the ease
in attaining cloud services (e.g., data storage, virtual computing environment hosting, email/communications applications, data archival, etc.), users are compelled to make use of these tools and services to forgo the “red tape” of dealing with central IT and possibly achieve cost savings. This is happening here at UMD at an increasing pace as services provided by the university are deemed less efficient and effective to use in comparison to the easily attainable cloud alternative. Risks are introduced, however, when no evaluation of licensing is performed and violation of laws and regulations governing IT at UMD, like HIPAA, FERPA, and export control laws, put sensitive research and personal data at risk of being compromised. As UMD grapples with the tradeoffs of opportunity versus risk and determines the right mix of creating private cloud computing resources and leveraging third-party offerings, presumably the cloud computing industry will mature as well. Together, these things should reduce the risks the university faces in using cloud services and make it easier for university community members to utilize this enabling technology.

Categories: Baseline Fundamentals, Creating Abundance

**Implementation Strategy**

Perform Analysis/Research

Form a project group to develop a review process to verify SaaS, PaaS, and IaaS offerings prior to service procurement, facilitating proactive prevention of service and/or data issues for UMD. An outcome of this process will be a document that vendors will be required to complete pre-purchase to create understanding of service offerings, security and data ownership.

**March 2014 Update**

A framework for purchasing SaaS/Cloud-based services has been shared with division staff members who have been engaged in rollout of remotely hosted services. This document will be the basis by which the project groups continue implementation of this action item.

In association with Action Item 6.8, the division is developing approaches for implementing hybrid cloud computing (combination of local and third party) for Web content.

**Action Item 1.8: Anytime/Anywhere Remote Access**

Recognizing that university community members need to access campus resources (files, applications, and services) from anywhere on the globe, safe and secure remote access solutions and access to virtualized applications should be provided.

Researchers, teaching faculty, administrators, students, and others continue to find the need to do the work of the university outside its walls — whether pursuing opportunities for collaboration in China or India, performing cutting edge research at CERN, or simply working from home. Providing university community members access to university IT resources as though sitting in the office can improve efficiency by enabling personnel to perform certain duties from anywhere. This could include not only access to files and data from off campus, but also the ability to easily and safely access the applications and computing resources to work with that data remotely, without having to have a duplicate desktop environment built on a personal or mobile computing device.

Category: Creating Abundance

*PROMOTING INNOVATION: IMPLEMENTATION STRATEGIES AND UPDATES MARCH 2014*
Implementation Strategy

Perform Analysis/Research

This action item articulates well with Action Items 1.3 and 1.7, and it is part of a broader view of service offerings and how Web access to services is changing demands for availability, including remote access. These three action items taken together will form the basis to drive initiatives that will facilitate remote access in a safe and reliable manner.

March 2014 Update

The University of Maryland is partnering with Adobe to implement the Creative Cloud for Enterprise. This will give UMD students, faculty, and staff remote access to Adobe products offered under the UMD enterprise contract.

The Division of IT has contracted with Box.com for a new cloud-based service for UMD students, faculty, and staff. The new service provides access to cloud storage that allows the user to set file share permissions, offers collaboration among users, and provides 50 GB of cloud-based file storage that can be accessed by any device, anywhere, at any time.

TERPware is another new service that was implemented to provide faculty, staff, and students with anytime, anywhere download access to software procured for the university.

Action Item 1.9: Broad Software Licensing

Provide needed software tools in the most effective ways possible to faculty, staff, and students. This could be achieved by developing efficient means to license software broadly for the entire university community, or through cooperative efforts of relevant units and central IT, or via virtualized desktop infrastructure (VDI). It will likely be the case that a combination of all these means will provide the best solution, and the Division of IT should lead the university in a thorough evaluation resulting in appropriate specific actions.

While the university has been successfully engaged in bulk PC buying for a number of years, there is a potential for additional savings related to economies of scale in the purchase of software licenses. Some broad software licenses exist but are not available to all university constituencies, while other software is purchased separately in smaller quantities by multiple departments. The Division of IT will begin to better track and analyze what software is being purchased in what quantity and work with units to consolidate purchasing to achieve cost and resource savings. Efficiencies will be gained in terms of aligning partners with similar software needs who might not otherwise seek to find partners with whom topiggyback their purchases. The use of VDI certainly holds great promise, but it is likely not a singular solution to be pursued. That said, efforts to evaluate and appropriately make use of this technology must rapidly advance.

The Division of IT should work with the UMD community to coordinate the purchase and licensing — and potentially tracking and delivery — of software to identify opportunities for better volume/pricing/campus-wide agreements that may be available. Exotic singular use, discipline-specific software would not be part of this process unless its use has broader applications across
It shall not be assumed that centralized funding of such packages will be possible, though centralized coordination of different funding sources may have value.

Category: Creating Abundance

Implementation Strategy

The Division of IT will consult with UMD IT procurement staff to develop a program to evaluate software for broad-use or enterprise licensing and work collaboratively to execute contracts for obtaining software. The Division of IT will develop approaches for obtaining funding sources to facilitate this licensing. A comprehensive strategy for virtualization environments will be developed and will factor into the purchase, negotiation, and delivery process to make most effective use of delivery.

March 2014 Update

Several licensing agreements have been established, including agreements with Adobe and Microsoft. TERPware provides free, online access to these product suites, along with approximately 44 other titles.

Additional opportunities are being considered through cooperative purchase agreements through NET+ and the Committee on Institutional Cooperation (CIC).

Action Item 1.10: Integrated Identity Management System

Recognizing that many action items in this plan rely on the ability to verify a person’s credentials (login/password identity) before access can be granted to university systems, an efficient process and system for identity management must be constantly enhanced and maintained to accommodate the nuances in roles of individuals within the university and for integration with new system implementations. A unified/federated university-wide identity management framework, which allows quick and efficient moves/adds/changes within the university as well as the ability to grant limited secure access to partners outside UMD, is the foundation of security and collaboration.

Nearly every UMD-centric system/application requires authentication (login/password) before any access is granted. When university systems are implemented, consideration must be given as to how to protect access to only those who are properly vetted. Currently, there is at minimum a day-long wait period before the database of user credentials is updated with new hires, and often this is elongated to several days. For outside collaborators (consultants, research partners, etc.), an affiliate status must be granted, currently requiring a lengthy approval process. To accommodate more centralization of enterprise services such as this on campus, as well as external collaborative efforts like the new MPower initiative, and without compromising security, a more streamlined process for adding staff and outside collaborators is desired. Likewise, the identity management architecture should hold one system as authoritative despite appointments, affiliation status, or other such relationships with the university. Currently, the identity management architecture is retrofitted and updated as an afterthought to accommodate new systems and/or changes in relationship status with the university. A clear design, implementation plan, and standard set of procedures for identity management should be documented with changes controlled as stringently as other critical university systems. It is also the case at this time that there are many competing issuers of identity at
UMD, and while this diversity provides local flexibility, it constrains global efforts to facilitate external collaboration. To take advantage of global IdM collaborative efforts such as InCommon, UMD must have a unified identity architecture without stifling the ability to localize identity management where it is essential for technical innovation in research.

Category: Baseline Fundamentals

**Implementation Strategy**

Consult Stakeholders

The university community, as noted in the strategic plan, has expressed the need for more timely and consistent access to applications and resources within the University of Maryland, College Park system. Current provisioning of identity goes through a lengthy process that requires entry into multiple systems of record, batch processing, and then downstream deployment of information to multiple locations for synchronizing and deployment.

In direct collaboration with campus partners (e.g., data stewards, system owners, HR, etc.), projects resulting from this action item will result in an integrated identity management system that will interface with existing and future systems to provide rapid deployment of data to appropriate systems and manage the roles and groupings needs of the university. Work on this system will begin with a requirements gathering, design, and implementation phase. The system will need to be standards based and abstract enough to be anticipate the future needs of the university. The university already follows InCommon standards and will extend that model for future collaborations with other universities. An inventory of authentication methods used across the university will be created to look for opportunities for consolidation and migration to central authentication systems. Use cases for partnerships with outside collaborators will also be developed in order to meet both on-campus and off-campus collaboration needs in a secure and efficient environment.

**March 2014 Update**

A needs analysis is currently under way.

**Action Item 1.11: IT Sustainability**

In support of the university’s goals for sustainability, the Division of IT, the Office of Sustainability, and local IT units will work together to pursue measures that promote more effective power management and lower operational energy use overall.

Through such technology as server virtualization, the university has already drastically reduced the number of physical servers running at any given time. A concerted effort will be made to further lower the carbon footprint of technology on campus through better desktop and printer power management and practices. The IT community will work with the Office of Sustainability and the university community to reduce power consumption without adversely impacting productivity.

Category: Baseline Fundamentals

**Implementation Strategy**

Perform Analysis/Research

Identify opportunities to improve IT power management efficiency through best practices applied university-wide, including, but not limited to, data center facility management, server virtualization,
consolidated use of high-performance computing for research purposes, storage management, and client device management. In conjunction with Action Item 1.1, an assessment will be made of the Power Usage Effectiveness (PUE) of every data center facility on campus. Recommendations will be developed for best practices to improve PUE when possible, as well as consolidating facilities where appropriate. Continue partnership with the Office of Facilities Management and the Center for Advanced Life Cycle Engineering in collecting energy usage data and results of configuration changes. In conjunction with Action Item 1.7 (cloud computing), identify IT functions to be moved to the cloud (on- or off-campus) resulting in a lower energy usage on campus. Continue to participate with the university Sustainability Committee in its goals.

March 2014 Update

Working with Facilities Management and Mechanical Engineering/Center for Advanced Lifecycle Engineering, an energy audit was performed in the Primary Data Center (PDC) resulting in efficiency recommendations creating real energy and financial savings for the university. The first recommendation, to shut down two cooling units in the PDC, has been implemented, resulting in an expected energy savings of over $10,000 annually. An incremental increase of the return air set points on the PDC cooling units is under way that is expected to save an additional $10,000 to $15,000 annually. Now in the second year of the data center energy audit project, the model developed during the PDC audit is being applied in an audit of the Secondary and Research Data Centers. We anticipate recommendations for these data centers that will further university sustainability goals. This data center energy audit model, developed and tested in Division of IT data centers could then be applied in other IT facilities across campus.

The project to make the Cyberinfrastructure Center operational is under way and near completion. This facility will help consolidate a currently distributed research IT hardware energy load. Currently much research IT hardware is housed in makeshift facilities within academic and administrative buildings not designed to efficiently house IT hardware. By centralizing research computing on Deepthought2 and/or in the colocation facility while shutting down the inefficient spaces, the overall efficiency of the campus IT facility footprint should improve.

We are also looking into power management tools for desktops and managed labs.

There is an ongoing initiative to increase the percentage of servers that are virtualized across the Solaris and Linux environments. The increased use of virtual machines means less hardware actually consuming energy.

Recommendation 2: Information Technology Resources (Support and Enablement)

The University of Maryland should develop and maintain a robust, multi-tiered staff support environment that meets the diverse levels and specific needs of the university community so that community members can effectively use the university’s abundant technology resources.
Action Item 2.1: Leveraged Support Model (Campus-Wide)

To better leverage the varied and diverse support resources at the university, a well-articulated model should be developed and communicated defining the roles that users of technology, departmentally based IT support providers, and central IT play in collaboratively supporting the ecosystem of the university.

In addressing the broad needs for the support of the use of IT, at UMD (as it must at all similar institutions) there must exist a definition of the framework of responsibilities for leveraged support that includes the following support providers: users themselves, locally-based IT support staff that support users of IT, and the central IT organization. A leveraged model is one in which the roles, responsibilities, and support mechanisms are not only well defined — as such models readily exist — but are well understood and functioning as a matter of daily activity. The Division of IT will be responsible for implementing programs and structures that support the university’s collaborative model and for ensuring that all of the key players are positioned to fulfill their roles.

Category: Creating Abundance

Implementation Strategy

Consult Stakeholders

Roles and responsibilities of the various IT support organizations will be discovered and defined in a collaborative effort. Using a leveraged support model, IT support organizations will move forward under the definitions and guidelines that will be established in the leveraged model.

March 2014 Update

Small college and large college academic IT directors meetings have been combined into one academic IT meeting.

The Division of Information Technology Mobile Device Management (MDM) project has brought together division and unit IT staff to evaluate technology and develop a service that will function by utilizing a distributed management structure (i.e., all participants use the central MDM software/infrastructure but independently manage their devices).

To enhance resources available to support personnel at Maryland, the university has joined the HDI Higher Education Forum/Leadership Connection. In addition, the Division of IT’s managers of client support staff will be attending the HDI national conference and will begin to attend the local chapter meetings. HDI is the worldwide professional association and certification body for the technical service and support industry.

The Division of IT is reaching out to local IT groups to better understand their operations and to document external contact information.

The Division of IT is partnering with the comptroller’s office to provide Tier I and Knowledge Base support for the Kuali Financial System.
Action Item 2.2: Streamlined Service Access for UTCC

The Division of IT Help Desk should streamline access to higher-tiered area experts so that departmental IT support staff can quickly be escalated to more senior and specialized technologists.

A streamlined path to resolution for the needs of unit IT staff is integral to maintaining positive collaboration between central IT and local IT support. Given the highly distributed nature of IT service and support at the university, central IT must be sensitive to the needs of and demands on unit IT staff and must provide a more direct route to higher tier help for unit IT staff, rather than having them go through being processed and routed by less technically skilled call-takers. Streamlining this process benefits both sides by cutting down on the time that any one resource spends waiting to escalate or be escalated with no movement towards resolution of the issue.

Category: Creating Abundance

Implementation Strategy

A phone number that by-passes the standard help desk process will be created and shared with the University Technology Coordinating Committee (UTCC) constituents so that they more readily have access to the assistance that is needed. Determine circumstances under which and methods for other escalations allowing for access to area experts without leaving the requestor with no response or documentation of the situation.

March 2014 Update

A phone number that by-passes the standard help desk process during regular business hours was created and shared with the University Technology Coordinating Committee constituents. In addition, the Network Operations Center hotline and the IT Operations number were shared with UTCC for after-hours use.

Action Item 2.3: Identify Campus-Wide Subject Matter Experts

In conjunction with Action Item 2.1, the Division of IT should establish subject matter experts in areas of high value to unit IT support and, via the defined model, make them available to local IT to assist not only in resolving problems, but also in assessing needs for new technologies and developing support for such new technologies.

The Division of IT has historically focused its support on basic frontline “triage-like” services. UMD IT support staff would greatly benefit from the presence of technology (Windows, Mac, UNIX, etc.) and application (database, GIS, statistics, etc.) area experts who could be drawn upon not only for deeper problem resolution but also for exploring new or enhanced technologies and applications.

Category: Creating Abundance
Implementation Strategy

As part of the process of defining roles and responsibilities of the various IT support organizations as discussed in Action Item 2.1, subject matter experts will be identified and recorded. Subject matter experts will be identified from all IT organizations across campus and the information made available through the appropriate communication vehicle.

March 2014 Update

A leveraged support model is being developed for content management tools (e.g., Sharepoint and Drupal). Several Division of IT staff members have received “power user” training and will be able to consult with clients or refer them to a broader group of campus experts when necessary.

IT Help Desk full-time staff members are enhancing their skills in order to function as a true Level 2 support staff able to resolve more specialized questions without needing to escalate to other groups. They are now providing assistance for use of Microsoft Office, Visio, and Adobe products, as well as installation support for SPSS, Mathematica, and MATLAB.

Action Item 2.4: Service Catalog

In conjunction with Action Item 2.1, the Division of IT and unit IT support providers should clearly publish service catalogs and articulate offerings so that campus community members can easily determine where to get desired tools and support.

The Division of IT has historically been somewhat of an opaque structure with regard to its services and support functions. To improve its reputation with the university community and to increase the effectiveness and efficiency of that community’s dealings with the division, a clearly articulated online service catalog should be produced. The service catalog must then be continuously maintained and updated, and the division should communicate enhancements to available services to the university community periodically.

Category: Baseline Fundamentals

Implementation Strategy

A project will be created and initiated in order to gather information and publish service catalog data for the Division of Information Technology service offerings. The project scope will be inclusive of a process by which data in the service catalog will be kept current.

March 2014 Update

A division team reviewed service catalogs from a number of universities and developed functional and technical requirements for a UMD catalog. Service information has been collected and edited. A vendor was selected to build the catalog as part of a redesign of the division’s website. This project started in January 2014 and is expected to be completed by June 2014.
Action Item 2.5: Formalize Career Paths

The university must articulate a plan for recruiting and retaining world-class IT staff while developing current resources. A clearly defined personnel development track for technology staff at the university should be treated with care equal to or greater than the maintenance and operation of the systems they support.

*Human resources are the single most important IT asset for the university as well as any enterprise. In order to retain excellent staff and attract and recruit new staff as needed, the university must not only follow through on the path to excellence in IT as defined by this plan, but also must develop strategies for developing and retaining those already on board. Traditional paths to higher salaries usually require promotion to supervisory roles. In order for this to benefit the institution, however, significant investment in management training and time spent mentoring new managers is required. Excellent technical performers who wish to remain on staff with the university, but who do not wish to (or are not ready to) take on a management role, should not be dis-incentivized from staying by the lack of availability of higher salaries. The Division of IT should work with university HR staff to create processes that clearly articulate personal development plans for each employee, that capture the desires of the both the employee and the division, and that lay out clear objectives and goals toward those ends. All managers of staff will be required to fulfill a pre-defined number of hours of management training each year. Alternative means for rewarding exemplary staff efforts or service on an ad-hoc basis should be identified and communicated to managers.*

Category: Creating Abundance

**Implementation Strategy**

*No Predecessor Tasks*

Working with the appropriate Division of IT staff, identify career paths within the university and the skill sets associated with each position within a career path. Once career paths and skill sets are documented, work with the appropriate division and campus human resource professionals to formalize career paths. Additionally, factors that promote employee recruitment and retention will be identified and appropriate action will be taken to implement those factors.

**March 2014 Update**

The Campus Information Services group (phone operators) is in the process of refocusing. Several current staff are being trained for a new IT Assistant position within the Help Desk. This will provide a new career path in information technology.

Action Item 2.6: IT Staff Development

*Those who use IT and those who support its use locally must be adequately trained so as to minimize their demand for broader support and maximize the effectiveness of their use of IT. Therefore, training and education programs should be continuously enhanced and developed, acquired, and delivered in such a way as to provide the most cost effective solution.*
IT enablement, much less innovation, cannot be achieved with technology adoption. Effective and constantly updated training and knowledge resources are integral to technology adoption. Training must be incorporated into the new leveraged support model for all technology. Planning for every technology implementation must include integrated training time, budget, and methodology. With every new technology adopted, appropriate methods of training must be determined. Options could include in-house training through a train-the-trainer model, ad-hoc training opportunities (e.g., contractor, online, or hybrid), and others.

The possession of appropriate knowledge and skills by users of IT and those who support them locally is a critical element to a leveraged support model and IT enablement. The Division of IT needs to develop education and training programs to ensure that users of IT have the knowledge and skill they need to make use of IT and that local IT support staff are well trained in the technologies and applications used by their local constituents.

Category: Creating Abundance

Implementation Strategy

Training efforts will be supported in multiple ways including but not limited to: mentoring, external and internal courses and training, coaching, job shadowing, webinars, and conferences. Training should encompass not just technical skills and proficiency but also skills in other areas such as customer support, professional writing, business analysis, and project management.

March 2014 Update

Lynda.com was procured for campus training needs and was made available at UMD in late January 2014.

Access is now available to the Microsoft e-academy, as provided under the university’s Microsoft enterprise license agreement.

Action Item 2.7: Garden of Architectures

The IT environment at UMD should take a flexible approach to the architectures and types of systems deployed so as to take advantage of the widest array of opportunities presented by the marketplace. UMD should adopt a philosophy of a “garden of architectures” rather than seeking singular and limited technological solutions.

A vast array of systems and technologies has evolved on campus. The ubiquity of technology and increasingly savvy consumers have caused the trend of moving away from enterprise standardization on a single architectural direction or product. While groups should not be dissuaded from looking at the myriad of solutions on the market, a clear framework for business decision making at the enterprise and unit level should be communicated and help with decision making should be easily sought through local and central IT.

The purpose of this action item, however, is to confirm the university community’s view that singular monolithic technology standards are inappropriate. The university must find an appropriate balance
on the continuum between restrictive standards and chaotic variances where multiple technologies are efficiently supported.

Category: Baseline Fundamentals

Implementation Strategy

A better understanding of the current architectures and deployed systems must be obtained. The task of identifying the intended future state of the technical environment should then be completed. With an “As Is/To Be” assessment complete, the technical roadmap can be developed and appropriate frameworks engineered so that diverse needs of the university can be met through well-articulated infrastructure. The development of this framework and oversight of the technologies within the framework will ultimately need to be undertaken and supported by a system architect.

March 2014 Update

Dell has been contracted to perform an Efficient Enterprise Assessment. The assessment will include an end-to-end analysis of the Division of IT’s technical architecture within its Support and Infrastructure group. The assessment will focus on level of complexity in the environment based on internally developed industry standards and an analysis of customer cost of IT service delivery. The detailed understanding of current operational processes and related support costs will enable Dell to make actionable recommendations that, when implemented, will result in a substantially improved (efficiency, effectiveness, cost alignment), simplified future mode of operations.

Action Item 2.8: Expanded Presence at Orientation (2.8a) and Online Information (2.8b)

The new faculty orientation process (for both teaching and research faculty) should include detailed, expansive, and engaging training to aid in faculty members’ familiarization with the technology tools and services deployed in learning and research environments on campus.

As new faculty members are on-boarded, learning environment and research technology familiarization and adoption must be as integral as knowing how to fill out their timesheets. This technology orientation should be a joint effort between the Division of IT Support and Enablement and local IT staff as appropriate. An IT service catalog and support structures should be presented with clear instructions on how acquire any needed services. Screening of incoming faculty should be performed in conjunction with the Office of Faculty Affairs and the Center for Teaching Excellence to gather data regarding prior experience with IT services and support at other institutions and with the faculty members’ familiarity with the IT tools provided so that UMD’s offerings and leveraged support model can be fine-tuned.

Category: Creating Abundance

Implementation Strategy

While the Division of Information Technology does participate in campus faculty orientation efforts, the division should continue to look for opportunities to expand their presence at campus orientation and join college-specific technical orientations. Additionally, information shared at orientations should also
be available online and available for reference when faculty need to use the information outside of the orientation.

March 2014 Update

A new Division of Information Technology Service Catalog project will result in service information in an online resource and common format.

Action Item 2.9: IT Accessibility Standards and Guidance

Given the diverse set of special needs of university users, accessibility of IT systems and services must be considered thoroughly in existing and new system implementations. Standards and guidance in accessibility should be collaboratively developed to accommodate these special needs and promulgated to all university IT service providers. The standards should be guided by best practices available within the community and in accordance with existing laws and regulations. A task force destined to become a part of IT governance should be convened as a first step to consider the challenges and chart a path toward implementation of this action.

Achieving IT Abundance at UMD means that all of its diverse population has IT tools and support available. This must include those on campus with special needs related to vision, hearing, speech, or other physical impairment. Efforts have begun recently to help ensure that IT services are available to students, faculty, and staff with special needs. Programs like those in the Division of Student Affairs, should serve as a model for the university, and the Division of IT should be an active partner in such efforts for all university constituents to ensure that enterprise and critical systems are developed with the accessibility needs of all university citizens in mind.

Category: Creating Abundance

Implementation Strategy

Consult Stakeholders

Standards and guidance, as guided by best practice, laws and regulations, in accessibility will be collaboratively developed and promulgated to all university IT service providers. A task force destined to become a part of IT governance will be convened as a first step to consider the challenges and chart a path toward implementation.

March 2014 Update

The division is actively participating in several accessibility groups and committees, including the Student Affairs Accessibility Committee, the EDUCAUSE IT Accessibility constituent group, and the CIC Accessibility Committee.

In conjunction with Action Item 9.1, the Campus IT Accessibility Working Group held its kick-off meeting in December 2013.
Recommendation 3: Scholarly Enablement

The University of Maryland should develop and enhance the information technology resources that, through effective, innovative, and extensive use by faculty in teaching, enable students’ scholarly achievement.

Action Item 3.1: Blended and Online Education

Online learning, whether in a blended learning environment or completely asynchronous online, allows university IT and UMD faculty to collaboratively explore the potentials of IT tools and to together understand the exciting new ways of teaching and learning the tools enable.

Formal programs that build upon these collaborations, developing IT skills and techniques, are a matter of strategic importance.

In 2012, the potentially disruptive force and movement toward some new online learning systems (Massive Open Online Courses or MOOCs, e.g., edX, Coursera, and Udacity) and new learning practices (flipping classes, pervasive uses of multimedia), provides motivation for UMD to explore their benefits and drawbacks and to prepare faculty and students for the most effective uses of online pedagogy. The evolution of online learning environments presents opportunities for the university to reach new learners and, beyond that, to reach all learners in numbers and ways never before possible. Academic faculty and IT should be partners, exchanging ideas and collaborating. Improvements in knowledge creation, dissemination, and preservation thus will build on this partnership, as well as on lessons already drawn from previous formal programs.

Category: Creating Abundance

Implementation Strategy

As the University of Maryland provost’s office continues to explore and develop the blended and online education strategy, the Division of IT will partner to support the technical ecosystem necessary to support that strategy. In addition, the Division of IT will offer formal programs to encourage faculty to develop IT enabled teaching techniques and skills.

March 2014 Update

The Division of IT continues to support multiple options for pedagogically based technology innovation for teaching and learning. During 2013, the division strengthened and modified a number of offerings:

- Innovations in Teaching and Learning Conference co-sponsored with CTE;
- Learning Technologies Institute for face-to-face and online content for current, new, emerging, and cutting edge technologies;
- Brown Bag discussions on best practices lead by faculty;
- “How do I...?” Webinar series on discreet topics of new and emerging learning technologies;
- SLOAN-C workshops online for blended and online learning; and
- Online webinars and workshops sponsored by ELI, NMC, Campus Technology, and others that bring in faculty for topics in contemporary advances and challenges in higher education.
Additionally, course development teams in collaboration with the University Libraries are providing assistance to faculty in the creation and delivery of their Coursera MOOCs, and Tea Time Tech Talks were introduced in Fall 2013 to provide a relaxed informal atmosphere to allow for faculty-focused conversations on relevant topics in teaching and learning in collaboration with University Libraries.

Action Item 3.2: Classroom Technology

All classrooms on campus should provide a standard common and advanced IT-enabled learning environment. All classrooms should be regularly maintained and refreshed on appropriate technology lifecycles. Classrooms should be constantly monitored to ensure that the technology is functional and stable. In support of traditional classroom instruction featuring global enrollments, technology resources, advanced network connectivity, and support resources will be available to enable faculty to deliver lectures world-wide via virtual classrooms.

In conjunction with Action Item 3.5, a robust suite of tools must exist that facilitate maintenance of existing and creation of new IT-enabled teaching methods. Support personnel must continue to perform preventative maintenance on classroom environments to ensure predictable, stable, and available in-class systems at all times. A clearly defined plan of training and outreach must accompany the roll-out of the standard learning environment. This plan will encompass in-classroom training, virtual training sessions, and a video library of best practices, and will be supported by a cadre of technical support personnel. A strategy will be in place to implement updates in response to problems.

Category: Creating Abundance

Implementation Strategy

A classroom technology lifecycle management program will be established to assure classroom technology is current and useable. This lifecycle management program must be inclusive of a technical infrastructure management model that allows for monitoring of equipment from remote locations in order to provide proactive support services to classrooms. Additionally, methods will be investigated to determine appropriate means to provide advanced technologies to facilitate innovation in the classroom.

March 2014 Update

The Division of IT is operating at full capacity for current staffing levels to support the 254 general purpose classrooms outfitted with technology on campus. There has been an influx of STEM funding to support upgrading approximately 70 rooms to support the technology needs of STEM classes. Temporary funding has been secured to hire two additional AV technicians to support the installations in the STEM-funded rooms.

The Edward St. John Learning and Teaching Center is on track to open in Fall 2016, and all of the classrooms in the building will provide opportunity for innovation and collaboration. Additionally, renovations of current classrooms and old spaces like the Tawes Theater are planned to help prepare
faculty for the innovative classrooms designed for the new building. Funding has also been secured for upgrades in the Jimenez technology classrooms to support the CIC course share initiative.

Action Item 3.3: Next Gen ELMS Deployment

With the mid-2012 long-term procurement of a new Enterprise Learning Management System (ELMS), Instructure Canvas, the Division of IT will partner with all university academic departments to deploy the new LMS in the most efficient manner possible. In so doing, the university will recover expenses from the previous LMS contract to more effectively support of the overall learning environment.

The university will see cost avoidance with the newly purchased ELMS year-over-year, and these funds will be targeted for bringing on instructional designers and other learning environment specific support personnel to enable faculty to use technology for instruction that is as effective and high-quality as any university in the nation. The new ELMS allows for integration with social networking tools so that collaboration can happen inside and outside the classroom more efficiently, between instructors and students, among students in learning groups, and between instructors.

Category: Baseline Fundamentals

**Implementation Strategy**

No Predecessor Tasks

The new learning management system (LMS) was deployed in January 2013. This effort was done in collaboration with many instructional support staff in all the colleges on campus and the libraries. This approach has created a more robust support structure on campus and is building a community of trainers and support staff that can also support each other. As the LMS grows and changes to meet UMD needs, the campus support network will continue to be used to support faculty.

**March 2014 Update**

- Instructor support of ELMS: http://elms.umd.edu/page/instructor-support
- Student support of ELMS: http://elms.umd.edu/page/student-support
- The ELMS Management tool continues to be developed to provide better access for faculty and staff to support their own courses or the courses in their departments.
- Work continues to create knowledge articles to provide easy access to support materials for campus constituents.
- The Division of IT has engaged Instructure for Canvas Tier 1 support to provide a 24x7 access to phone and online support for Canvas in addition to the direct support offered to faculty and students.

Action Item 3.4: Develop Strategy for Defining and Implementing Campus Learning Environments

Even as the university moves to a new Electronic Learning Management System (ELMS) platform in 2013, a clearly articulated vision for the future for an overall campus learning environment including ELMS and the integration of associated applications and functions must be developed.
All classrooms will become learning environments with a standardized suite of applications that are easy to operate, reliable, and universally accessible. Learning, teaching, and research will not be bound by location, either on campus or around the world. The learning environment will guarantee secure, 24x7 supported, anytime, anywhere, any device access to students, faculty, and staff. This environment will include not only all classrooms, but all places learning takes place on campus. Within the broader context of the learning environment, UMD should expand support for video, slides, chat, and other tools meant to foster collaboration between faculty and students. The learning management system (ELMS) is the foundation for the learning environment and must be well supported with input sought as to potential enhancements by its user base several times annually.

Category: Baseline Fundamentals

Implementation Strategy

Consult Stakeholders

Working with the provost’s office and other campus governance structures, the Division of IT will engage in the development of strategy for defining and implementing campus learning environments. The Division of IT will partner to support the technical ecosystem necessary to support the learning environments.

March 2014 Update

To support the concept of anywhere anytime learning with ELMS (UMD’s Enterprise Learning Management System powered by Canvas) as the foundation, the Division of IT has engaged numerous vendors to provide integrations through Canvas (ELMS) to support a wide variety of learning experiences, including Learning Objects for collaborative and peer interactions, ShareStream and Panopto for multimedia sharing, and Turning Technologies for instructive student response. We will continue to create integrations that support the learning goals of our faculty, including Qualtrics, Adobe Connect, and Box. In the physical environments based on student surveys and focus groups, the division is collaborating with the libraries to create a seamless informal learning environment experience for students, as well as exploring innovative, flexible instructional computing spaces.

Action Item 3.5: Remote Tech Assistance for Classrooms (3.5a) and Streamlined Pre-Class PC Setup for Instructors (3.5b)

Recognizing the critical need for minimal class start-up time, staff support for instructors in classrooms should be available almost instantly, whether accomplished with in-person, on-site, or remote virtual presence or some combination. A goal should be that pre-class setup should occur in three minutes or less.

With a campus of classrooms as distributed as UMD’s and even as use of the learning environment moves into virtual space, a support model that is versatile and comprehensive enough to accommodate any situation must be developed. The current model of central and distributed support will be further solidified, whereby a clear process exists covering the time a problem is identified to the time of a resolution. Part of this enhanced support model for the learning environment must include additional training and development. Frequently occurring issues will be identified and
documented and notification of resolution steps will be sent out to faculty, and, if necessary, enhancements will be made to the system to avoid common recurring issues. Learning environment help options will be multi-faceted to help achieve faculty ready time of three minutes or less prior to class.

Category: Baseline Fundamentals

Implementation Strategy

As mentioned in Action Item 3.2, a classroom technology lifecycle program must be developed for technologically enhanced rooms. A classroom management infrastructure that allows for remote/proactive monitoring and remote assistance must be made available in classrooms with installed technology. Additionally, PC support infrastructure must be streamlined to improve the ability for instructors to conduct pre-class technical setups quickly.

March 2014 Update

The teams responsible for implementation and support of classroom technology are reviewing their processes and associated support technologies.

Action Item 3.6: Professional Networking (3.6a) and Conference Presentations (3.6b)

Initiatives that promote peer-to-peer collaborations among faculty to encourage and promote the adoption and enhancement of IT-enabled teaching techniques should be continued where they exist and further developed, not only across this campus, but in partnership with other institutions globally.

New ideas for use of technology are constantly emerging through faculty interaction on campus and with peers abroad. Thought leaders at UMD exist and are consistently early adopters and pilot testers for new initiatives. Leading institutions of higher ed are also consistently being written about for their innovation in using technology to better enable effective learning. As technology better enables collaboration and sharing of knowledge among faculty on campus and their partners outside UMD, incubation of cutting edge development of such tools must begin to emerge here in order to achieve stature as a leading innovator in higher ed. Technologies such as a mature unified communications and collaboration platform and organizational development programs, such as those hosted by the Center for Teaching Excellence and the Division of IT to enhance knowledge creation and dissemination, must flourish and specifically target development of new ways to make instruction more effective and to help measure these improvements in absolute terms in achieving the overall business goals of the university.

Category: Creating Abundance

Implementation Strategy

It is important to make professional contacts, engage in higher education communities, and join professional affiliations to establish relationships that lead to peer-to-peer and institutional collaborations. In addition, staff should take advantage of the opportunity to present at conferences and meetings in order to foster communication and collaboration with faculty and other institutions.
March 2014 Update

- The Division of IT recently became an affiliate of the Future of Information Alliance at the University of Maryland.
- The Assistant Director of Learning Technologies and Environments is now the President-elect of the Consortium of College and University Media Centers.
- The Deputy CIO of Support and Enablement has been named as an Ex-Officio from the Division of IT to the Educational Affairs Committee of the faculty senate.
- The Director of Learning Technologies and Environments is a member of the General Education Implementation Committee and represents the university to the New Media Consortium. He has also served on the program committee for the EDUCAUSE Learning Initiative annual conference and their Focus Session on MOOCs.
- Some Division of IT staff members regularly participate in numerous conferences and meetings including presenting on topics from mobile learning, to blended course development, to using lecture capture, to learning in the cloud, and more.
- Under Division of IT leadership, the University of Maryland has joined the HDI Higher Education Forum.
- The Division of IT actively participates with EDUCAUSE, which is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology.
- The Division of IT is an active member of Internet2 and the Committee on Institutional Collaboration.
- The Division of IT actively participates in the Learning Technology Consortium, a group of nine schools that focus on the use of technology for teaching and learning.

Action Item 3.7: Experimental Classroom

**UMD should create and support facilities for testing and prototyping new technologies that would be used in instruction by faculty.**

*Such facilities, also known as “sandboxes,” will include hardware, software, staff support, technology, and other resources in an incubator-like environment and will encourage the development of emerging techniques and the sharing of best practices. Such sandboxes will emerge from a coalescence of current separate (though cooperating) entities, including but not limited to the Division of IT, the Center for Teaching Excellence/Office of Undergraduate Studies, University Libraries, Graduate School, iSchool, College of Education, and others.*

*Category: Being Innovative*

**Implementation Strategy** Consult Stakeholders

The Division of IT and the Center for Teaching Excellence will develop and support an experimental classroom to give faculty an opportunity to explore new techniques for teaching, new learning space designs, and cutting edge technologies in a classroom setting. The location of the facility must be determined during the project with the St John’s Center being a potential candidate for this facility.
March 2014 Update

No progress to report.

Recommendation 4: Research Enablement

The University of Maryland should develop and maintain plentiful information technology resources that enable and advance discovery and support innovation, collaboration, and entrepreneurship when effectively and broadly used by faculty in research.

Action Item 4.1: High-Performance Computing/Cyber-Infrastructure

The university must consider whether there are benefits to a holistic approach for the provision, advancement, and support of high-performance computing (HPC) and other cyber-infrastructure (CI) to include storage, networking, visualization, data sets, software, and personnel to advance research across all disciplines. The Provost, the Vice President for Research, and the Vice President of IT should convene key constituent deans and others to address the fundamental question: Is UMD approaching the provision of HPC and CI appropriately given collective vision for the future? Next steps regarding this action item should logically evolve from that point, including articulation of such a vision and a plan to bring it about.

Currently, high-performance computing at the university is provided by several entities, focused largely on highly regarded and valued (though locally focused) interests and uses within specific organizations and disciplines; the only exception being the resource (Deepthought, a limited broadly-based resource) maintained by the Division of IT and offered to all campus users. A focused group led by the two vice presidents and the Provost, key HPC/CI-focused deans, and key discipline leaders (i.e., those who see the value in use of HPC/CI) — along with those who lead groups or functions responsible for distributed centers of excellence in HPC/CI — should quickly meet to address the vision about the long-term impacts of HPC/CI on discovery at UMD, and determine if the current distributed strategy will adequately address this vision or if a more holistic strategy has merit. Many institutions have adopted such strategies, and there are many models to consider — ranging from a centering of effort in a single entity to more collective, consortium-like efforts with multiple and separate entities working from an organized institutional plan but functioning in harmony. The “how” of such a solution is important to be sure, but what should first be addressed is whether there is the view that it is needed, and regardless an understanding of how resources should be provisioned to support whatever model is chosen.

Whatever model is selected, it must take into consideration the impact of privacy laws, regulations, and policies (e.g., HIPAA, export control, etc.) upon that model/approach to ensure that solutions do not constrain broader approaches; flexibility to account for uncertainty and change in these conditions must be considered as well. Significant attention must be paid not only to the provision of hardware and software for HPC and other physical elements of CI (including visualization technology), but also to providing appropriate and abundant trained support personnel who can...
assist and enhance the use of whatever resources are provided. This, in fact, must be a key focus in any endeavor, regardless of how it is structured and organized.

Category: Creating Abundance

Implementation Strategy

Consult Stakeholders

The key constituent deans and vice presidents (Provost, Vice President for Research, Vice President of IT) have initially met (late 2012) to discuss the question posed in the action item. More discussions involving the above parties as well as discipline-specific department chairs and leading faculty must occur in 2013 as the institution evolves a strategy that is appropriate for Maryland; this process will be led by the Provost and supported by her colleague VPs. Related to these initial discussions, the Division of IT has begun to plan for new and augmented HPC/cyberinfrastructure resources to more effectively handle the intensive computing needs on campus and with off-campus partners. In this process, the division will engage a range of campus HPC/CI experts (consumers/researchers) to solidify plans for these resources, as well as to consider provision of a range of centralized support options (facilities, sysops, sysadmin) to be made available for other campus HPC resources (e.g., BSOS); this to establish options for colocation or “condo-ized” opportunities. Regarding the new and augmented resources mentioned above, the division will engage with governance workgroups (9.1) to formalize a more collaborative body to make decisions on allocation (i.e., an allocation committee and process) of these centralized HPC resources deployed by the Division of IT.

March 2014 Update

It was decided to centralize support options (facilities, sysops, sysadmin) to be made available for other campus HPC researchers. The Division of IT is partnering with colleges to pursue a holistic approach to provisioning Deepthought2 with 300 teraflops and 1 petabyte of usable storage. This will be available during the first half of 2014. It is expected to rank the University of Maryland among the top university systems in high performance computing.

Action Item 4.2: Research Tools, Services, and Support

In collaboration with a broad group of researchers, the Division of IT should identify and understand the superset of tools and services used by the research community and develop a support model for those tools, including acquisition and funding of them and deployment and support for their use.

The Division of IT certainly cannot carry this burden alone. The Division of Research and the Division of Academic Affairs (represented by the deans) should support the Division of IT and jointly examine the challenges faced by individual researchers and their needs for very specific forms of support (such as mathematical/statistical tools, modeling and visualization tools, etc.) to enable their research.

A specific identified need involves establishing official UMD websites on individual researchers’ endeavors and providing a framework for provision and support of such websites. This would include a standard template for research websites and resources and guidance for establishing and maintaining such websites.

Category: Creating Abundance
Implementation Strategy

While the broader strategy for the institution unfolds as part of deliberations from Action 4.1, the Division of IT (including elements of research enablement developing within the Mid-Atlantic Crossroads GigaPoP, or MAX) will begin to analyze the research community at UMD and identify gaps in available research tools along with the specialized need for service and “humanware” support that could be provided both centrally and locally. The findings from this process will provide input to a more detailed strategy for purchase of tools and development of a comprehensive services and support structure to help enable researchers to have seamless access to research-oriented IT. Some of these tools may make sense to purchase (and some of the human support resources may make sense to deploy) ‘ad-hoc’ while the broader strategy from 4.1 evolves; but others may be more prudently held for address once a set direction for the university is established.

March 2014 Update

When Deepthought2 is launched, additional research tools will be available, including MATLAB plus other resources to help make using the cluster easier and to help in solving computational problems. The Division of IT will offer an HPC Boot Camp in late May and early June. The division, as part of the Campus Visualization Partnership, is offering a lecture series during the Spring 2014 semester with speakers from both inside and outside the university. The division is also offering matching grants up to $7,500 to up to five researchers for visualization stations and software to further the use of visualization around the university.

Action Item 4.3: Research Social Web

The Divisions of IT and Research should work with the university research community to develop an online and interactive clearinghouse of information regarding current research areas (and listing individual researchers) to facilitate collaboration and interdisciplinary research engagement. The Division of IT should, in partnership with the university research community, develop using a social networking model a means for researchers to connect with potential collaborators both inside and outside the university. This should be closely integrated with the existing “Expertise@UMD” site, which is currently available to provide search tools to specific research areas by UMD researchers.

Research and the creation of new knowledge is rarely a strictly individual pursuit. The ease with which collaborative research partners can be found in the era of social networking should be greatly enhanced. Several intra- and inter-campus initiatives are in development or already available to catalog our researchers and their areas of study. Social networking tools combined with a robust unified communication infrastructure should be examined for inclusion and the business case assessed to determine their benefit to this endeavor. In the meantime, traditional means of collaboration (e.g., development of communities of practice, Listserv lists, blogs, wikis, etc.) can be implemented in preparation for a more comprehensive solution for research collaboration.

Category: Being Innovative
**Perform Analysis/Research**

The Division of IT working closely with Research Administration and other elements within the Division of Research will launch a process for gathering requirements to achieve this action item in consultation with various researchers and key stakeholders across campus. Other systems on campus (e.g., Expertise@UMD) and those provided by other peer institutions will be evaluated and a buy vs. build vs. borrow decision will be made for implementing a system to fulfill this action item.

**March 2014 Update**

No progress to date. Expertise@UMD does list high-performance computing as a search term.

**Action Item 4.4: Identify and Engage Funding Partners**

The Division of Research, the Division of IT, and the Division of Academic Affairs (the deans) should together — with involvement of key research faculty — examine the opportunities for increased private sector funding (or provision of needed resources) and how broadly across disciplines such partnerships advancing innovation could be developed.

As available funding from traditional sources (National Science Foundation/NSF, National Institutes of Health/NIH, etc.) may shrink in the years ahead, continuing UMD’s momentum in research will require greater interaction with private sector (corporate) entities to explore opportunities. Current policies, approaches, and philosophies must be re-examined to determine how to best take advantage of these non-traditional research funding, resource sharing, and entrepreneurial opportunities. Pilot endeavors across a number of disciplines should be explored and advanced.

Category: Being Innovative

**Consult Stakeholders**

The Division of IT will convene the named stakeholders to begin developing a strategy for increased funding from additional partnerships. As potential funding partners are identified, they will be engaged to discuss current and future opportunities for collaboration on research projects. This topic will also be addressed by the governance structure (Action Item 9.1) workgroup on research, and a formal plan will develop from this collective effort.

**March 2014 Update**

We are working with the University of Maryland, Baltimore as part of the MPower initiative to increase collaboration among researchers at the two institutions. Use of one other’s high-performance computing facilities is in the early stages of planning.

The state has provided funds for The Johns Hopkins University in collaboration with the University of Maryland, College Park. The cluster will be housed in Baltimore, MD. This large cluster will offer further computational power to our researchers. Planning for the facility and cluster is under way. It is expected to be operational in late 2014 or early 2015.
Action Item 4.5: NSF/Policy Compliance

The Division of Research and others in the UMD research community, the University Libraries, and the Division of IT should continue to assess the needed technical infrastructure and preservation/curation support necessary for UMD to comply with the January 2011 mandate by the National Science Foundation (NSF) for data management plans accompanying research grants.

On January 18, 2011, the NSF instituted a requirement that every proposal for grant funding include a two-page document describing how the proposal conforms with the NSF policy on dissemination and sharing of research results (complete information can be found at www.nsf.gov/eng/general/dmp.jsp). As the need to accommodate this requirement through additional data security, storage, and presentation architecture becomes more well-defined, the Division of IT will build out additional capacity to adhere to the mandate.

Category: Creating Abundance

Implementation Strategy

Consult Stakeholders

The Division of IT will convene the named stakeholders to begin developing a strategy for providing the appropriate infrastructure based on the NSF data management plan. Based on the gaps in current infrastructure and adherence, a comprehensive strategy for fulfilling this action item will be developed by the named stakeholders and other key constituents affected by this policy.

March 2014 Update

University Libraries has developed a site (http://www.lib.umd.edu/data) and practice to help researchers develop data management plans. The division is acquiring backend storage to support.

Recommendation 5: Student Experience

The University of Maryland should provide and support plentiful information technology resources in the living and learning environment that enable and enrich the broader experiences of students’ innovation when used effectively and profusely.

Action Item 5.1: Wow Factor

The university must provide a top-quality IT-enabled living and learning environment, complete with ubiquitous wireless and support for the use of IT where we live, study, and gather on campus. The Division of IT and the Division of Student Affairs should be charged with working to establish a seamless, safe, and secure IT environment across all parts of campus and with ensuring that when students arrive at UMD, their IT experience equals or exceeds that of their prior educational environments. In short, there should be a “Wow!” factor associated with coming to UMD in terms of the pervasiveness and impact of the IT experience.

Many students live on campus and have their IT needs provided by the institution (Division of IT or Division of Student Affairs). Students expect to have consistent, ubiquitous service across campus,
seamlessly provided between their living and learning environments. Expectations that students have are increasingly for very robust IT-enabled environments featuring rich network connectivity (wireless, wired, and cellular-networked) and services (voice, data, and digital media). UMD must strive to ensure that students coming to the university find at least an experience equal to very robust environments they have in their homes or in their previous scholastic environments (high schools, community colleges, other institutions) — and in many cases, they should experience a step up in the IT experience.

Category: Creating Abundance

Implementation Strategy

Consult Stakeholders

The Division of IT will convene the named stakeholders from the action item who will meet to evaluate the current state of the student experience along with input from a cross-section of UMD students. A process for periodic evaluation of student experience will be developed to continue assessment of fulfillment of student needs. The group will develop a detailed plan for achieving a campus student IT experience, which accommodates the recommendations and action items documented in the plan and the means to assess progress and success toward achieving the “wow” factor will be developed and measured.

March 2014 Update

No progress to date.

Action Item 5.2: Student Technology Refresh

Recognizing that IT plays a key role in the student life experience beyond academic aspects, the university should continue to work closely with students to evaluate new technologies and IT-based services to not only improve the academic aspects of student technology use, but also to support the overall student life experience at UMD.

The life experience of a student at a prestigious flagship university involves more than just their academic experiences. Technology — and information technology specifically — is an underlying component in nearly every aspect of the lives of today’s (and tomorrow’s) students. While the adoption and support of IT in applications discussed throughout this strategic plan — in classrooms, broader online learning environments, research, and university processes — are critical to students’ experiences with college life, there is also significant value to “living and learning” and even recreational aspects to college life that are IT enabled. The Division of IT should explore new and creative uses of technology that improve the overall (traditional) college life experience, including forms of recreational technologies. It will always be the case that students will need to elect which such college-life-enhancing technologies they adopt as individuals or as members of the UMD community — and elect how such technologies are provided and funded. Students should continue to engage with the Division of IT, and also with other university leadership, in exploring new technology options, present an attitude advocating their adoption, and support such adoption in line with student interests and prudent and safe use of resources.

Category: Creating Abundance
Implementation Strategy
Consult Stakeholders

Using existing student groups and governance structures, work with students in evaluating and selecting technologies to aid in their academic and personal endeavors. Incorporation of feedback mechanisms, such as surveys, will also be used to determine technology needs at UMD.

March 2014 Update

- A student advisor group is used to advise the Vice President of IT on expenditure of technology fee dollars. The procedures for submitting Tech Fee proposals were streamlined with an online process led by the Division of IT.

- The division participates in the annual EDUCAUSE ECAR survey of students and their experience with information technology. Data from UMD and other participating institutions sheds light on basic institutional IT services and pedagogical practices and helps the university to understand which innovations students value the most.

Action Item 5.3: Provisioning Student Tech Needs

The university should continue to offer programs and services which facilitate student ownership of IT devices and make possible the acquisition of technologies (hardware, software, and services) at discounts and in convenient locations or in a convenient manner.

UMD represents a large population of IT consumers, and this is especially true with the student population. Students coming to UMD should expect to find that their status as “new members” of this great community has benefits when it comes to the acquisition of information technology tools — hardware and software specifically. Nearly all students own multiple forms of such devices — desktop computers, laptops, tablets, smartphones, game consoles, and more. Where the university — and specifically the Division of IT — can help is in ensuring that excellent programs for group discounts are available for hardware and software, and that useful outlets for acquisition (such as the Terrapin Technology Store) and service are available and easy to access and use. The institution should pursue, on behalf of students, special pricing bundles from vendors and make known any and all relevant discounts available to students for software and peripheral products (printers, scanners, etc.). And through Action Item 1.9 regarding software licensing, the university should continue to pursue, with student support, broad software licensing available for “free download” or other means described in that action item.

Category: Creating Abundance

Implementation Strategy
Consult Stakeholders

Tied into implementation of Action Items 5.1 and 1.9, the Division of IT will collaborate with IT governance structures and student-oriented bodies (e.g., Student Affairs, the tech fee advisory committee, student government), to continually determine student IT purchasing needs and user
demographics. This data will drive a strategy for purchasing, whether for enterprise licensing, more local bulk licensing, or ad-hoc purchase.

March 2014 Update

The Division of Information Technology has resources that are dedicated to continually reviewing campus personal technology needs with constituent groups and working with vendors to bring the latest hardware and software that provide significant broad based benefits to the community at minimal price.

Specific steps taken and under way are:

1. An Enterprise License Agreement (ELA) for Microsoft Windows and Office products for students was completed during the summer of 2012. To date, there have been more than 53,000 Microsoft downloads, representing savings over educational pricing of more than $4.5 million and over retail pricing of more than $12.75 million.

2. Adobe creative software was made available for download to faculty, staff, and students at no cost. As of December, 2013, there were 29,528 Adobe downloads, representing savings over educational pricing of $11.75 million and over retail pricing of $31.75 million.

3. The Division of IT, in cooperation with University Libraries, opened a new facility in McKeldin Library. This space includes the Academic Computers for Terps warranty repair facility, Help Desk operations, and a Terrapin Technology Store display area where campus community members can explore, learn about, and purchase the latest technologies.

4. Site licensing was negotiated for Red Hat Enterprise Linux Operating System software, which is now available to all campus constituents at no cost.

5. The Division of IT is working with departments individually and collaboratively on broad-based software license agreements that are applicable to various disciplines. One example is Lynda.com, which is a collaborative effort of University Human Resources, University Libraries, and the Division of IT. Lynda.com provides online training with thousands of courses, spanning a wide range of disciplines.

Action Item 5.4: Student Tech Proficiency

Recognizing the importance of the use of technology in learning environments, in conjunction with Action Item 2.6, the university should ensure that all students either have the necessary skills or can acquire them through non-credit, university-offered training programs so as to ensure their success in the pursuit of scholarly achievement.

Today's students enter UMD much better prepared in the use of most forms of information technology — including the fundamental basic applications used for personal productivity (word processing, email, etc.). However, some limited number of students may be arriving on campus not as well trained or skilled in the use of these tools, and this presents them with a challenging form of “digital divide.” The Division of IT, working in cooperation with the Division of Student Affairs and the Division of Academic Affairs and in consultation with student leaders and representatives, will
examine the need for basic, fundamental skills training in IT use and build programs to address shortfalls. When new tools are introduced into the environment that are beyond basics (but not at levels usually taught in the for-credit curriculum), training and education programs (either traditional classroom or online/computer-guided) should be provided.

Category: Creating Abundance

Implementation Strategy

In the same manner that the student technical resource page was created to support the new ELMS system, a Web page that collates information concerning UMD technology resources will be created. This Web page should reflect technical resources and training that are available for all students. Additionally, the Division of IT service catalog will list training resources for a service if such a resource exists, and the Knowledge Base will enable self-help.

March 2014 Update

The Division of IT, in collaboration with University Human Resources and University Libraries has procured Lynda.com, a service that provides access to online training for UMD faculty, staff, and students in order to learn software, design, and business skills to achieve their personal and professional goals.

The IT Knowledge Base is a growing resource where students (and faculty and staff) can find how-to articles on the spectrum of technologies used at the university. Its development is an ongoing effort, currently with more than 800 entries.

Action Item 5.5: Physical Computer Lab Consolidation Strategy

In 2012 with the knowledge that nearly all (if not all) students have at least one personal computing device available for their use, the Division of IT in collaboration with academic departments should engage students (and faculty) in an analysis of the value and purpose of traditional “fixed” computing facilities (such as computer labs and clusters), and determine their future at UMD.

Since the advent of the personal computer, universities — including UMD — have invested heavily in providing computing devices for student use in clusters, labs, and other locations. In early days, these clusters were there because most students did not own a personal computer, and thus in order to make use of computers in support of learning, it was an institutional responsibility to provide them; a responsibility nearly always supported by students through the use of their technology fees. As student ownership increased in the early part of the past decade, these facilities retained their value to students who found the convenience of a well-supported and readily available device on campus to be desired and even necessary (in a day when their computers were back in their residences on their desks). And, even after the arrival and more pervasive use of laptop and mobile devices, students still found these fixed location facilities of value to aid in the ergonomics of use (easier to write a 2000-word paper on a desktop than on one’s lap) or the deployment of special purpose software. However, with the evolution in the use of these devices changing each and every year, the
question(s) should be annually posed: Does UMD still need fixed-location computing facilities to support student use; and is there a better use of that funding to enable broader software licensing or other forms of IT-enablement valued by today’s student? The Division of IT should work with the Campus Student Technology Fee Advisory Committee to address this question each academic year (as each year the membership of this committee changes) and to involve faculty and others in this important question.

Category: Creating Abundance

**Implementation Strategy**

Perform Analysis/Research

Using existing student groups and governance structures, work with students and academic departments in analysis of the value and purpose of physical computer labs to determine if they best meet the needs of UMD and take action to make improvements as determined by this analysis.

**March 2014 Update**

No progress at this time.

**Recommendation 6: IT and the Enterprise**

The University of Maryland should develop and maintain plentiful information technology resources and develop (or acquire) and deploy (or arrange for) information systems, applications, and tools that enable the effective and efficient function of the university as an enterprise.

**Action Item 6.1: Financial/Lifecycle Model**

Recognizing that legacy university enterprise information systems are based on outdated technologies, the university should accelerate their replacement. These systems should be made more robust and functional as they are modernized and replaced by newer, more readily supportable technologies. Representative users from the community should be involved in the selection and specification of such systems, assess their usability and functionality, and take leading roles in their implementation.

As legacy systems continue to age, resources needed to support, maintain, and enhance those systems become more scarce and costly. Preparatory steps must be taken to ensure continued maintenance of legacy systems, while preparing for their disposition and ultimate replacement. Some of these steps include documenting legacy systems, planning new architecture, etc. An investment lifecycle model should be applied to all systems to determine their position on the cost versus maturity curve overlaid with the risk tolerance attributed to the system. While the high cost of maintenance and replacement of legacy systems cannot be avoided completely, the university can better budget for and manage resources toward a well planned and executed program of legacy system replacement by taking a holistic approach to identification of legacy systems needing replacement and better planning for the lifecycle of all existing and new systems.

Category: Creating Abundance
Implementation Strategy

To maintain and modernize our software enterprise while adhering to a strong financial foundation, a model to evaluate and monitor our information system’s financial and functional lifecycle will be developed. The model will allow for broad application, but contains enough critical information to effectively evaluate and track systems in an ongoing manner. To develop the model, the Division of IT will convene a committee composed of IT, financial, and functional representatives to address two primary areas: 1) Development of a system lifecycle evaluation model and 2) the collection and codifying of existing systems. The evaluation model will need to, at a minimum, encompass the development of a general system lifecycle, the selection of standard cost and benefit analysis techniques and tools, and required disposition and transition planning for end of system life. A subcommittee should also address the challenge of documenting and codifying existing systems to bring them into compliance with these standards. The subcommittee will also develop recommendations for the ongoing monitoring to ensure existing and new systems are included and that the standards stay pertinent to current technologies. The knowledge management and retention effort should focus on ensuring current systems are able to plan for replacement, and if needed, schedule a date for disposition.

March 2014 Update

Substantial progress has been made on the assessment and review of administrative computing systems including lifecycle and risks. A draft document to aid the Enterprise Systems Working Group’s (created under Action Item 9.1) system assessment has been started. Staffing and support plans for current administrative systems have been developed.

Action Item 6.2: Develop Scalable Standards

The Division of IT, in collaboration with the campus IT staff, should review the current standards where they exist and identify appropriate architectures and tools so that departmentally-based systems may integrate or scale up securely and successfully with the broader enterprise system environment.

Recognizing that there are information systems that are tangential to main enterprise systems, and that these systems perform critical and vital service in local environments, a common development framework is needed. While departmental systems may be viewed in the context of specific needs, if they are developed outside of maintainable and supportable architectures, their long term efficacy is in doubt and can impact the broader function of the university. Special purpose needs and demands for local units to develop to specific requirements of their programs will be considered in accomplishing this action item such that those needs are not adversely affected.

Category: Baseline Fundamentals

Implementation Strategy

The Division of IT will collaborate with departmental IT units to identify current systems in development as well as software architectures and tools in use. The Enterprise Systems Governance Committee, or a new task force consisting of members from both the Division of IT and the departmental IT units, will
review the catalog of architectures and tools, determine if they are meeting the current and long-term needs, compare with those currently supported by the Division of IT, and set standards. Disaster recovery, security, and long-term sustainability (of both the architectures and personnel available to support them) will also be considered. Upon completion of the review, the Division of IT will alter and enhance its support for the selected architectural standards and tools. This will include infrastructure and personnel, documentation, and identification of appropriate training resources. Finally, a schedule to periodically re-evaluate the standards and appropriate channels to communicate developments and updates will be created.

March 2014 Update

A Division of IT internal dashboard has been created and contains detailed information on the existing software architectures and tools in use. This dashboard includes the inventory of enterprise software systems (both built and bought), their use, stakeholders, technology stack, age, lifecycle status, etc. A staffing artifact has been created to assist with determining long term sustainability based on personnel available to support the associated systems. The division is developing an information map of all managed systems indicating how information flows through the IT enterprise.

Action Item 6.3: Data Analytics

The Division of IT, in collaboration with the Office of Institutional Research, Planning, and Assessment and other large scale data consumers and analyst constituents on campus, should consider the current and future business intelligence needs and design and implement data analytics tools to best serve university and outside needs.

The university must significantly enhance the access to and delivery of information in support of decision making. Concerns about security, privacy, and disaster recovery should be balanced with the institution’s need to function successfully. The environment should enable access to information without needing to understand complex technologies. Appropriate users should be able to extract information into documents, spreadsheets, or other usable forms and to all levels of personal computing/display devices (i.e., mobility enabled).

Category: Being Innovative

Implementation Strategy

The Division of IT will collaborate with the Office of Institutional Research, Planning, and Assessment (IRPA) to determine what types of data requests would be most useful to the main constituents of the university starting with the president’s office, provost’s office, IRPA, comptroller, and Academic Affairs. A proof of concept project will be completed and include a few use cases to answer data-driven questions from each of the main constituents. A few reports/dashboards will be created that include both operational and trend data. A tool for consuming the information will be part of a proof of concept phase. The proof of concept will be analyzed based on ease-of-use of the BI artifacts (reports, dashboards, tools) and ability to answer university business queries as well as pedagogical ones. The results of the proof of concept will be examined to determine subsequent phases.
March 2014 Update

IRPA, with the support of the Division of IT, has finished their initial evaluation of BI tools. This will replace their current Hyperion (Brio) tool, which is nearing end-of-life from the vendor. IRPA is currently working on the RFP, and the division is assisting. The overall BI Proof of Concept will be discussed in subsequent meetings of the Enterprise Systems Governance workgroup.

Action Item 6.4: Pursue Open/Community Source Software

The Division of IT should champion the pursuit of open or community source software solutions for enterprise-level use and only pursue more expensive commercial offerings when there is sufficient value or functional advantage in doing so.

Limitations and risk (e.g., security, version control, release management) previously ascribed to open source software are being mitigated with governance structures like those including community source. Community source software development differs from traditional open source development in that communities of institutions are committing specific human resources toward an implementation, which not only fulfills enterprise-wide needs of the partnering institutions, but also may be implemented by other institutions once development is complete. Kuali is an example of a community source system development in which UMD has taken a leadership role. This enterprise resource planning (ERP) development initiative is being developed out of a number of lead institutions, including UMD, and when completed will include financial, student information, enrollment, and other modules to manage the major administrative functions of our or any university. A number of other disciplines within higher education are being impacted by open source/community source, including learning technology software. As UMD systems are planned for replacement, given the vast human resources available (and needed for enterprise open source development), an evaluation should be considered of the factors (e.g., security, version management, support, etc.) in determining the viability of open source/community source as an alternative to commercial product implementation.

Category: Creating Abundance

Implementation Strategy

The Division of IT will recommend and implement open-source/community-source solutions. The principles of Borrow, Buy, Build will be followed and recommended to all units that are considering new systems.

March 2014 Update

After a soft launch in mid-December, Kuali Financial System (KFS) went live in production January 6, 2014. The launch was a success, with limited technical issues which have been addressed. The Division of IT has assisted the comptroller’s office with this effort and continues to provide help where needed. Currently, the project is evaluating long-term support options. The division is also assisting with the migration of software interfaces from the FRS systems to KFS. KFS is a community-source finance...
packaged developed by the Kuali Foundation, of which Maryland is a founding partner.

**Action Item 6.5: Document Management and Workflow**

Enterprise information systems should include provision for centralized document management and facilitate online workflow. All new systems should strive wherever possible to eliminate manual/paper document handling and routing.

Currently, the university is using a 10-year-old document management system with limited workflow capability. Extensive market development in this area has made this a relatively low-cost technology to update with much enhanced flexibility in scanning, storing, retrieving, and archiving documents and forms, and also in applying intensive workflow and approval processes to such documents/forms. Implementation planning should be performed, with participation from all university academic and administrative units, to develop the business cases for this critical and ubiquitous need.

*Category: Creating Abundance*

**Implementation Strategy**

The Division of IT will collaborate with university constituents to gather strategic business needs for document management and online workflow. The document management steering committee (DIG) should proceed with implementing the recommendations from an outside vendor’s comprehensive review of the system and strategic direction. The steering committee should develop a comprehensive plan to leverage the system’s workflow capability to gain efficiencies in exchanging information within the university. The committee should develop a program to educate and onboard new departments in pursuit of achieving the university’s strategic goal to become paperless. The steering committee and campus constituents should work more closely with the system’s vendor to ensure the vendor’s technology is being used properly and efficiently.

**March 2014 Update**

Since October 2013, the enterprise document management system known as Optix has been under the purview of the Enrollment Services Office (ESO). Digital Imaging Group (DIG) and staff members from ESO will engage with university constituents to advance the document management system initiative. The Division of IT will continue to work with DIG and Enrollment Services as needed to help support current enterprise document management efforts.

**Action Item 6.6: Fostering Mobilization**

Realizing the increasing dependence upon small mobile/smartphone integrated devices, key university information and processing systems must have mobile application support. Essentially, a user should be able to securely conduct all of their university enterprise activities from any device, anywhere, at any time.
Mobile devices continue to provide great flexibility and opportunity for consumers and present significant challenges to the IT support personnel who must accommodate their use. As IT departments strive to accommodate consumers with more keen understanding of technology, those consumers also want the flexibility to bring the latest personal device to work or school and use it to interface with UMD services and infrastructure. This phenomenon is known as Bring Your Own Device (BYOD), and a by-product of this is that not only are there a myriad of devices being brought and inserted into the UMD network, there is an even greater number of platforms being run on those devices (e.g., iOS, Windows Mobile, Google’s Android, Mac OSX, Windows OS, Linux, etc.), which we have dubbed Use Your Own Platform. While support becomes exceedingly more difficult as more device types and platforms become a part of the fabric, there is no question that expectations continue to be that services and applications at least have an interface geared toward mobile use. Therefore, mobile development should not be an afterthought in developing applications and their interfaces. Rather mobile interfaces should be given equal weight to traditional interface development. We should embrace responsive Web design in our sites and applications to enable the same content to be attractively rendered on any device or screen size.

Category: Creating Abundance

Implementation Strategy

Consult Stakeholders

Convene a committee to embrace bring your own device (BYOD) and understand the associated benefits and risks. Committee members should include students, business, IT, legal, and security stakeholders. Develop and document evaluation criteria that will be used to determine appropriateness of all mobile development activities. This discussion should include functional and technical considerations. For example:

- Does it make sense from a functional perspective?
- It is technically necessary to develop native applications or would a Web application be appropriate?
- Are multiple versions of a mobile app necessary to accommodate different functionality for differently sized devices?

Using the evaluation criteria, the committee can begin to identify and prioritize mobile development activities.

UMD should commission a survey or a similar information gathering activity designed to identify device and operating system trends present on campus to assist in identifying appropriate development tools. Commit to revisiting this effort on a regular basis to ensure UMD’s mobilization efforts reflect current and emerging trends.

UMD should explore the possibility of collaborating with vendors of cross platform development tools in pursuit of more robust cross platform capabilities.

The Division of IT and other departmental IT stakeholders should draft a security plan that covers, at a minimum, remote access to registered devices, security guidelines for end users, application control, data and device encryption, and any other identified security concerns.
The Division of IT and other departmental IT stakeholders can work to establish and publish software development guidelines that require that developers include an analysis of the appropriateness of mobile access as a standard part of the software design process.

Establish a mechanism for gathering use metrics to allow for more targeted expansion and enhancement of mobile development activities.

March 2014 Update

No progress to date.

Action Item 6.7: Task Force to Establish Governance Model to Leverage Strengths of Distributed Structure on Campus

Within the context of a leveraged support model and the creativity that often results from individual or departmental endeavors, mechanisms should be developed to examine these creations and determine if they may be more broadly leveraged across the university.

There exist examples of systems that grew out of local unit IT operations to be expanded into enterprise-wide systems. Encouraging and facilitating innovative local achievements must prevail with the knowledge and forethought that systems may be scaled up at a later time to meet the needs of a broader university constituency. Guidance, informed by discussions between central and local IT units, on local system development should be provided to help facilitate eventual scaling of systems to a broader audience. System development guidance and framework should be promulgated and adherence overseen through peer review to achieve uniformity in system development methodology and thereby allowing collaborative resource and knowledge sharing when development is occurring.

Category: Creating Abundance

Implementation Strategy

In an effort to support departmental entrepreneurship as well as centralized standards, departmental IT units in partnership with the Division of IT will develop a governance structure which can leverage the strength of its distributed structure. Using lessons learned and work products from previous efforts (ITEM, UTCC) a committee will be convened to determine the most appropriate governance model which can balance these constituents. This committee will set governance guidelines which will then be used to enact subsequent efforts based on the outcomes. The committee should focus on the areas where central coordination is appropriate or helpful (e.g. cost, expediency, supportability, or security), as well as developing guidance for standard models of technology development and deployment. At the same time, the committee needs to ensure appropriate flexibility for local units and not stifle entrepreneurial spirit and autonomy.
In order to encourage collaboration between units, a standard collaboration space (physical or virtual) should be considered, allowing for knowledge exchange about best practices and solutions sharing. In addition, periodic showcasing of projects success and new product offerings from the distributed groups would help ensure exposure of the best-of-breed ideas to the greater community as well as celebration of success.

March 2014 Update
No progress to date. This will be discussed in subsequent meetings for the Enterprise Systems Governance workgroup.

Action Item 6.8: Comprehensive Web Strategy

With increasing demand in many areas of the university for general Web content development, hosting, and administration, IT service providers on campus should collaborate on developing a strategy to readily achieve agile Web services to most broadly and effectively answer on-campus demands and those of specific departments, programs, and individuals. While not strictly a responsibility of the Division of IT, given the diverse and broad nature of this challenge, the division should provide the foundation and start-up leadership in developing such a strategy by quickly convening stakeholders.

Web content management needs continue to be in high demand from an individual level, through the groups and programs they represent, to their colleges and for the entire university. Because there exists this enterprise need and there is currently a general lack of basic Web content management skills and services available to serve the needs of the university, a comprehensive strategy, including hosting, development resources, governance, and maintenance, should be considered on a broad level, with current successful Web initiatives serving as a model for promulgation. Decisions regarding what competencies we wish to foster in-house, what we feel is best left to third-party partners, and where we might be able to partner with peer institutions should be a primary topic of discussion in developing our strategy.

Category: Baseline Fundamentals

Implementation Strategy

Identify/Garner Funding

The Division of IT will establish a service to assist university groups in creating or updating campus Web pages and hosting them. IT staff will assist the campus in meeting UMD design and accessibility standards, defining website development requirements, determining software and platform needs, providing Web vendor options, and developing RFP documents when contracting for Web development services with outside vendors.

March 2014 Update
No substantial progress to date.
Recommendation 7: Funding IT Strategically

The University of Maryland should adopt a view that information technology resources are strategic assets to the institution, and, as such, models for funding of IT — both centrally and appropriately distributed throughout the institution — should be developed to encourage effective and abundant deployment of IT and efficient investment in IT holistically throughout the institution.

Action Item 7.1: Consolidated Charge Strategy

Recognizing that information technology is a strategic asset necessary for the institution and will become even more critical to the transformation of the institution, provision of fundamental IT elements must be done holistically and not via ad-hoc or charged elements. Essentially, charge-back “by the use” is generally viewed as non-productive and detrimental to the strategic provision of IT at UMD. The Division of IT should engage with governance structures to determine which aspects of IT are better delivered on a pay-per-use model and what the cost and charge mechanisms should be and which aspects are part of the expected intellectual infrastructure.

In today’s environment, IT infrastructure — such as communication service and connectivity (voice, data, wireless, etc.) — are fundamental elements of the campus infrastructure. One could argue that the data network grid is as critical to the operation of the institution (and life on campus) as the power grid; as significant to campus activities as the roads and buildings. As such, they should be a viewed as a fundamental utility and not as a “necessary supplement” or elected luxury. Funding for these basic and fundamental services — connectivity, storage, communication mechanisms, utility software licensing, etc. — should be done as a baseline item, and not via a charge-back model.

Information flow is now similar to the flow of electricity. Many leading institutions around the country are adopting this view — providing baseline funding for basic IT, and then requiring appropriate, robust, abundant, and evolving services and infrastructure for their investments. UMD has previously examined funding mechanisms for one key element — network connectivity — and has received a recommendation for this approach. The Division of IT and the Division of Administrative Affairs, via active efforts of their respective vice presidents and staff, should quickly advance such a model, perhaps as soon as academic year 2013-2014. Analysis of funding mechanisms for other key IT services and infrastructure should follow as a part of emerging IT governance, with the basic tenet that IT infrastructure or services which advance the institution’s mission should be funded under a “utility mode” and that only those services or infrastructure truly “above and beyond” or of a nature that use should be abandoned in favor of more cost-effective solutions should have charge-back funding models associated with them.

Category: Baseline Fundamentals

Implementation Strategy

Perform Analysis/Research

Some enterprise facets of Information Technology are already recognized and employed, for the most part, holistically such as software engineering, user support, learning technologies and computing infrastructure. However, the basic IT communications and networking infrastructure that carries and transmits all the other facets of IT is not. Steps are to be taken to provide for a utility model for those costs similar to what now exists for the campus’s basic utilities (i.e., heating, power, and light).
1. Identify those voice, data, and wireless costs that are reoccurring charge-backs to campus units by major responsibility areas (colleges, vice presidents, and president).
2. Identify those costs in the Division of IT budget that are provided centrally for other state-supported units (fringe benefits, fuel and utilities, and self-support administrative costs).
3. Work with campus academic and administrative leadership on a plan for changing the funding model for those items in 1 and 2 above from a charge-back/self-support unit costing model to a utility model.

March 2014 Update

In collaboration with the Provost, the Division of IT enhanced its billing model for network and telecommunication services. In fiscal year 2014, all non-academic campus units were billed once for network and phone services, rather than on a monthly basis. In fiscal year 2015, all academic units will be converted to the new billing model.

Action Item 7.2: Effective Centralization Model

Funding mechanisms that incentivize balanced long-term cost cutting should be developed to encourage appropriate centralization of services and infrastructure so as to best position the institution to evaluate moves of those services and infrastructure to the cloud.

As referenced in Action Item 7.1, funding models should encourage strategically-sound behavior (rather than discourage it). In the past, requiring the Division of IT to operate largely as a cost center under an auxiliary model has led to the need for charging for services like virtual servers, storage, and other technologies. This requirement for an annual charge often left deans, directors, and end users in the position of having to evaluate a direct cost item (the charge) versus provision of the infrastructure or service locally, funded out of “spare cash” or not fully taking into account fully-loaded costing. As a result, there is a highly “feral” and distributed model which is neither more effective nor cost efficient from an institutional perspective. Thus, the Division of IT should be funded for key elements centrally — or tasked to reallocate within its existing budget to create pools of funds to support these elements — and thus encourage the appropriate centralization of services and infrastructure to the overall betterment of the agility, efficacy, and efficiency of their provision. Examples could include free or highly subsidized virtual server services, which encourage the elimination of reliance on basic physical servers across campus, and free or highly subsidized tiered storage services, which encourage the safe and effective storage of institutional (administrative and research) data.

Category: Being Innovative

Implementation Strategy

Perform Analysis/Research

The Division of IT provides some services to campus on a charge-back model. The reason for this is to recover funds used to acquire equipment such as servers, storage, switches/routers, etc. and use these recovered funds to acquire upgrades, refresh equipment, and pay maintenance/support among other tasks. The charge-back model is used in varying degrees by different departments within the division. Several campus constituents have indicated that some of the service pricing is too high and they have preferred to acquire their own hardware and manage it themselves. In some cases the requirements of
the campus group have been larger than the existing infrastructure can support. To support appropriate centralization of services and infrastructure, we should partner with current and potential customers to explore alternative ways to fund the acquisition of equipment so that services can either be nominally priced or provided free-of-charge to campus constituents. While exploring these alternatives, we should ensure that there is emphasis on appropriate capacity planning for future years so funds can be budgeted at a proper level. A refresh and innovation model will be developed that describes the cost of support so that the university can consider allocations from a more central approach, or yearly charge rather than a service-based charge. Acquisition of data costs is an important step to the goal of IT abundance.

March 2014 Update

In 2013, the Division of IT made progress in its effort to broadly engage campus constituents on enterprise-level initiatives. In coordination with campus research partners, the Division of IT substantially built out a new Cyber Infrastructure Center, which has been made available to campus researchers at a nominal set-up cost. Other products and services such as Box.com, Adobe creative software, and Lynda.com training have been centrally funded. Also, the division led a campus-wide effort to develop a scope for the eventual purchase of an enterprise media management system.

Action Item 7.3: Develop Campus-Wide IT Replacement Standard

In partnership with all colleges and in concert with Action Item 6.1, a campus-wide best practice based standard for lifecycle replacement of IT elements (particularly personal computing devices) should be established and a review of current funding policies and programs should be made to ensure adequate lifecycle replacement occurs.

While the level of sophistication in hardware, software, and other physical technology elements may vary depending upon the use, all UMD employees that conduct work using such elements should have basic, reliable, and modern technology so as to be productive. At a minimum, this technology should be able to run the most up-to-date software and have the latest operating systems and application versions in place to ensure the machine is secure and functions effectively. Although not always the case, old or out of date technologies may threaten the security and integrity of UMD environment, reduce the efficacy of technology, and are inefficient in terms of the increased staff support required to maintain their function.

Category: Being Innovative

Implementation Strategy

Perform Analysis/Research

The Division of IT will lead an evaluation of enterprise and local replacement strategies to determine how issues such as decentralized funding will impact development of a campus-wide standard and what IT elements will be considered “in-play.” From this evaluation, a plan for a more comprehensive replacement program will be drafted and presented to appropriate governance bodies for review and adoption. If necessary, funding mechanisms will be secured to accommodate the plan, and
implementation will begin as prescribed in the documented plan. Part of the plan will include methods for determining ways to evaluate lifecycles that adhere to best practices with appropriate justification.

March 2014 Update

No progress to date.

Action Item 7.4: Campus-Wide Purchasing Arrangements

Across all aspects of IT (equipment, software, tools, training, services, etc.), in conjunction with more distributed governance structures, the university should strive for maximum efficacy and the most fiscal efficiency through the use of broad-based, centralized, holistic decision processes.

In the past there have been excellent examples of broad-based purchasing arrangements (e.g., Dell Bulk Buy), and these sorts of arrangements should be continued and where feasible expanded to include many more forms of hardware, software, and service commodities used across the university community. The Division of IT should lead this process, working closely with the Department of Procurement and Supply and fiscal and technology officers in colleges and departments.

Category: Creating Abundance

Implementation Strategy

This action item will be implemented by virtue of most if not all of the other action items in the IT strategic plan. Records of governance and committee structures will be kept to reflect upon the increased partnerships and collaboration being undertaken to implement and operate IT at UMD. Lessons learned for each new and existing partnership will be collected to help improve processes globally among current groups and future partnerships. Streamlined purchasing, operating, and implementation processes should result at a minimum.

March 2014 Update

The Division of IT funded a senior staff resource to be the university IT procurement lead. This role serves to create a program to help streamline, educate, and identify trends in IT purchases campus-wide. Several additional IT procurement resources were hired at the end of 2013 to help round out the staffing for this new initiative.

Action Item 7.5: Lifecycle Management Framework

When new systems or new technology services are deployed, a thorough cost and investment analysis should be done to ensure that adequate funding is allocated to not only provide for the initial implementation but to also ensure that ongoing annual costs are addressed, that any lifecycle refresh of equipment or other infrastructure is accounted for, and that any exit costs are identified. Entities that propose or mandate enterprise information systems should be required to perform these analyses. Local entities developing and deploying systems or technology services should perform similar analyses and have control over those processes.
Too often in the pursuit of the latest advertised technologies, full evaluation of all aspects of the cost of acquiring, using, supporting, and eventually disposing of these technologies (i.e., Total Cost of Ownership) are not considered. While we should not have “paralysis of analysis” and must recognize the need to deploy new technologies in a timely manner, we must balance the need for such with broader and longer term implications.

Category: Being Innovative

Implementation Strategy

A framework and rubric for performing a cost and investment analysis must first be developed; preferably by a cross-functional team of IT and business managers from throughout the university. Simultaneously, project management methodologies will be promulgated within the Division of IT and shared broadly to help facilitate proper project initiation and pre-planning with total-cost-of-ownership and return-on-investment calculation being an integral piece. When appropriate, third party data sources will be considered, such as Gartner and peer institutions. A catalog of enterprise-level systems will be generated so that as modernization of legacy systems is proposed, data about the existing systems can be input into the analysis framework. A risk aversion continuum will be created for helping decide at what point new systems should be considered based on cost and technology maturity axes. From this high level analysis, a framework for systems lifecycle management can be developed to help make sound budgetary decisions regarding enterprise system implementation/modernization.

March 2014 Update

No progress to date.

Action Item 7.6: Organizational Effectiveness Review

The Division of IT should engage in a self-evaluation and structured introspection of its function and the application of its resources.

A first such exercise should take place in fiscal year 2013 in an effort to help align the organization’s funding with the requirements of this new IT strategic plan. Periodic reviews should be undertaken thereafter every two to three years. This process — an organizational effectiveness review — should be carried out by the leadership of the Division of IT with a first phase to identify services, functions, and investments which are no longer aligned with the strategic direction of the division and the university (as defined by this IT strategic plan) and to yield savings through their reduction and elimination. An immediate, subsequent phase of the process should then be to look to this IT strategic plan for direction in reinvesting those savings into services, functions, and infrastructure that support the successful completion of action items of this plan. Reports of the outcomes of this process should be shared with the developed IT governance structures put into place as a result of this IT strategic plan.

Category: Baseline Fundamentals
**Implementation Strategy**

The Division of IT will identify core enterprise business goals for delivery and support of all enterprise systems and services. Against those goals, key performance indicators (KPIs) and success criteria will be developed to allow for measurement of performance. Mechanisms to gather customer satisfaction will be developed to provide the data to report against our KPIs and success criteria. From analysis of this data, potential areas for improvement will be highlighted for action and further discussion.

**March 2014 Update**

No progress to date.

**Recommendation 8: IT Security, Policy and Business Continuity**

The University of Maryland should deploy appropriate policies and effective enforcement means to secure the integrity of information technology resources, safeguard institutional information, protect the privacy of university community members in their use of IT, and ensure the continuity of the institution’s IT resources and information repositories in the face of possible disaster scenarios.

**Action Item 8.1: Advisory Committees (8.1a), Expanded Policy Awareness Activities (8.1b), and Online Presence (8.1c)**

> The Division of IT must lead the way to define standards for device and information security and to communicate best practices and policies across the university community.

> IT security is the responsibility of all members of the UMD community. However, that community relies heavily upon the expertise of the Division of IT to define standards based upon best practices and to develop and implement policies (and enforce them) to ensure that the community is best positioned to defend the integrity of the UMD environment. Motivations (i.e., sanctions, rewards, hybrid) to follow security practices must be defined for business-critical systems and those holding sensitive data.

Category: Baseline Fundamentals

**Implementation Strategy**

The Division of IT will establish two campus-wide advisory committees, one for IT Policy, and another for Standards and Best Practices (Action Items 8.4 and 8.7). Security and policy awareness activities (Action Item 8.5) will be expanded, including an online one-stop shop that will address the needs of the various campus constituencies. Resource requirements for the committees are addressed under their individual action items. Awareness activities can be addressed by existing staff within the division with modest additional funds for materials. While activities will be ongoing, a feature-rich online presence will be available for the beginning of the Fall 2013 semester.
March 2014 Update

Division staff worked with the USM IT Security Council to produce a revised set of security guidelines that are applicable to all USM institutions. The new guidelines, released in March 2014, provide the basis for the work of the security standards group. The http://it.umd.edu/security Web pages have been revised and will continue to be enhanced.

Action Item 8.2: Data Stewardship

The Vice President of IT working with university administration should review the current structure regarding data stewardship and determine whether that structure is appropriate to properly define and administer access to institutional data and to ensure that policies for such access are adequate and enforced.

There is a general belief that UMD’s data stewardship processes are mature. Our stewards (with oversight for financial, student, human resources, research, and other critical information sets), guided by university policy on data administration, take their roles seriously and provide the necessary checks and balances to prevent frivolous access to sensitive information from both applications and data warehouse inquiries. There may be the perception that obtaining approval for access from these data stewards could be more timely; though it may be likely that most delays are a factor of negotiating either border cases or requests that intersect with several stewards. The work flows for this process were redone fairly recently so as to utilize Kuali Rice. The biggest shortcoming may be in the area of data presentation. Most of the tools currently in use are showing their age, and the user interface on the ad hoc query tool may not be sufficiently flexible. Modernization of query and presentation tools should be a key element of a business intelligence initiative (Action Item 6.3). However, a formal — and periodically updated — review of the current structure, definitions, processes, and tools would be prudent.

Category: Baseline Fundamentals

Implementation Strategy

Perform Analysis/Research

The Data Policy Advisory Committee (DPAC) is composed of membership from each division of the university, major providers and consumers of institutional data, and legal counsel. In cooperation with the Division of IT, DPAC will conduct a review of policies and practices related to the use and management of institutional data during calendar year 2013. No additional resources will be required.

March 2014 Update

DPAC has completed its review of policies and practices related to the use and management of institutional data. Revisions to UMCP policy VI-22.00(A) UM Policy on Institutional Data Management and VI-23.00(A) UM Policy on Data Management Structure and Procedures were completed in November 2013.
Action Item 8.3: Implementation of External Audit Recommendations

The Division of IT should complete review of the recently (2012) completed external IT Security Review and in collaboration through appropriately discreet conversation with the university community, develop an implementation strategy to address points of concern raised by that review.

The Vice President of IT should charge the Chief IT Security Officer and Policy Director in his office with the responsibility (and the authority) to assume control, leadership, and responsibility for developing a plan to implement recommended actions that resulted from the 2012 IT Security Review by the Research and Education Network Information Sharing and Analysis Center. This will include responsibility for addressing unauthorized access to UMD’s IT infrastructure, unauthorized disclosure of electronic information, and any security/data breaches regardless of the university entity involved. It will also entail recommendation and specification of needed technology solutions to better manage network security and intrusion detection/prevention and the integrity of information residing on central and distributed data stores across the campus. It is not the case that all items identified by the external review will or should be adopted wholesale. Rather, in conjunction with collaborative governance prescribed in Action Items 8.4 and 8.7, appropriate items will be acted upon.

Category: Baseline Fundamentals

Implementation Strategy

The action items of this strategic plan address many of the outstanding issues from the external review in areas that include data center enhancements (Action Item 1.1), IT policy and practice development (Action Items 8.4 and 8.7), assessment of risk (Action Items 8.6 and 8.8), and additional audit controls (Action Item 8.5). A roadmap for implementation of remaining recommendations will be completed during the first quarter of calendar year 2013. The Standards and Best Practices committee (Action Item 8.7) will provide oversight to the execution of the plan. Many of the items in the review can be accomplished at minimum costs; others may require significant multi-year investment.

March 2014 Update

There were 112 recommendations, of which 72 have been addressed and completed, 17 are in progress, 16 have not yet been started, and 7 were not accepted.

Action Item 8.4: IT Policy Framework (8.4a) and IT Policy Committee (8.4b)

The University Libraries and the Division of IT should lead the university to develop clear and forceful policies to address the management and protection (integrity) of sensitive and business-critical information (data), including the university’s permanent electronic records, and the security IT infrastructure resources upon which that information resides. The Division of IT should also establish an IT policy advisory team composed of a variety of faculty and staff from across the university to assist in the review and formation of appropriate IT policies.
IT security is the responsibility of all users. The development and enforcement of security policies should be done in cooperation with the various departments. These policies will depend upon the clear articulation of institutional values and an understanding of how the institution will make judgments when its values are in conflict. For example, an individual has a right to personal privacy while the institution has an obligation to keep some records of individuals’ activities and to protect itself against actions of individuals. A key step in the formulation of policy will be the development of a shared vision of information and IT based on the beliefs and values of the university community: academic freedom, collegiality, openness, and so forth.

Because development of IT policies can bring the university face-to-face with fundamental issues about its values, the process will require broad support from throughout the institution and will call for leadership at the highest levels of the university. Because the implementation of IT policies involves an ongoing process of interpretation and oversight, it will need a sustained commitment of leadership, attention, staff, and resources.

Category: Creating Abundance

Implementation Strategy

Perform Analysis/Research

An IT policy framework must be established to facilitate the creation and promulgation of new policies. During the spring of 2013, a process will be developed to allow for the restructuring of existing IT policy and the establishment of new policy.

An IT Policy Committee composed of campus faculty and staff will be commissioned during the first half of 2013 to work with the Division of IT on the development and maintenance of campus-wide policies related to the use, management, and protection of information technology resources. There are no additional costs associated with these activities, although there may be fiscal impact as the result of policy creation or enhancement.

March 2014 Update

The policy committee will be constituted in Spring 2014. An inventory of required and recommended policy topics will be prepared based upon the newest release of USM security guidelines.

Action Item 8.5: Output of Action Items 8.4 and 8.7

Specific programmatic mechanisms should be reviewed and enhanced where needed to assure IT security and protection of information privacy.

Some details will depend in part upon the development of policy, but some aspects of security mechanisms are required for any policy to be effectively implemented. These include:

- Audit and controls: to verify that policy is being followed and to determine if mechanisms are working and correctly deployed.
• **Education and awareness**: to ensure that parties are aware of their responsibilities and to help engage everyone involved in managing and using information and IT resources as part of the university’s security plan.

• **Risk assessment**: to determine the need for protection, to specify mechanisms of protection, and to help prioritize choices of protection.

The university must provide the resources to ensure network security and meet the demands of federal and state regulations.

Category: Creating Abundance

**Implementation Strategy**

No Predecessor Tasks

The output of the IT Policy Committee (Action Item 8.4) and the Security Advisory Team (Action Item 8.7) will drive the specific mechanisms that will be implemented under this action item. The work of those groups will produce requirements to enhance security of networks, servers, desktops, mobile devices, and users.

**March 2014 Update**

Significant investments were made over the past year in the area of vulnerability assessment and audit log collection and correlation. Additional recommendations will emerge when the working groups begin in Spring 2014.

**Action Item 8.6: Campus-Wide Physical Security Assessment**

Specific physical mechanisms must be assessed and enhanced where needed to secure business-critical servers and access to sensitive information.

While network security is important to maintaining the integrity of our data and systems, the security of our data needs to be addressed at the individual and departmental levels as well. Data must be kept safe from breaches at all levels. The Vice President of IT’s office should immediately prepare a report on the status of physical security of the university’s information servers — with special attention to an assessment of such servers not located within the direct control of the Division of IT. Recommendations based upon the results of this assessment should be drafted and presented to the UMD community.

Category: Creating Abundance

**Implementation Strategy**

Perform Analysis/Research

The Division of IT will lead a campus-wide survey of computing environments in order to assess the physical security of those locations and the campus’ posture as a whole. A survey instrument, derived from government standards, will be developed during Spring 2013. With the cooperation of the campus IT community, the survey will be conducted during summer/early fall of 2013, with a final report issued by the end of calendar year 2013. This activity will consume an FTE for the duration of the project.
March 2014 Update

The survey instrument has been completed and is being tested against Division of IT facilities. The details of the campus-wide assessment will be discussed at an upcoming meeting of the University Technology Coordinating Committee and distributed shortly thereafter.

Action Item 8.7: Security Advisory Committee

The Division of IT and Office of the Vice President of IT should establish a security advisory team composed of a variety of department staff and faculty from across the university to assist in the review and formation of appropriate IT security practices.

Security is a shared responsibility that requires diligence from all parties involved. Communication is a critical element in the extensive coordination required to maintain a successful security program. Establishing a Security Advisory Team will not only enable the implementation of security policies, but also increase the level of objective input for security plans and actions. Establishing such a team will demonstrate the Division of IT’s interest in engaging expertise from the university community beyond central IT. Security will become a leading-edge issue in establishing relationships between the Division of IT and all university units.

Category: Creating Abundance

Implementation Strategy

A Security Advisory Committee (SAC) will be constituted during the spring of 2013. The committee will provide oversight for the implementation of recommendations of the Division of IT external security review. As the IT Policy Committee produces policy, the SAC will recommend best practices and formal standards of the implementation of those policies. The work of the SAC will be ongoing.

March 2014 Update

The Security Advisory Committee, made up of IT practitioners from throughout the university, will be charged to draft formal best practices and standards that are in compliance with USM Security Guidelines. This committee will be launched in Spring 2014.

Action Item 8.8: Review and Revision of Existing Risk Management, Business Continuity, and Disaster Recovery Efforts

The Division of IT should review the IT Disaster Recovery and Business Continuity Plan (DR/BCP) with input from the university community and support from senior-level leadership at the university.

While often fully addressed only after a major disaster or emergency brings an enterprise operation to its knees, the university must update and demonstrate an effective plan to continue critical university operations in the event of an outage of any magnitude. Information technology is a strategic asset of the institution, and loss, in part or total, of the IT environment, services, and data
can cripple the institution. Therefore, the Division of IT and local IT units must be prepared for the recovery of critical services so that the university can continue to function in the aftermath of an outage due to a manmade disaster or an act of God — whether the impact is limited to the data center, the campus, or the entire region. Sustained funding will determine to what level and in what time frame recovery can be possible. Funding for disaster recovery should be prudent, but in line with both the extent of risk and the level of expectations of UMD administration and the campus community. The plan should provide for:

- Revisions in existing processes and procedures with regard to data management and data center operations;
- Adequate backup power for critical university data centers; and
- Increasing levels of recovery based on priorities for restoring key services and infrastructure. A disaster recovery plan for IT should be developed and tested.

Data back-up sites for disaster recovery and business continuity will continue to be maintained in areas likely not impacted by the same events as UMD. Disaster recovery planning and the assessment of risks and priorities should include both centrally managed systems and distributed systems maintained on the campus or in various departments.

**Implementation Strategy**

The Division of IT will undertake a review and revision of existing risk management, business continuity, and disaster recovery efforts. Such an activity has already begun and will proceed on all fronts through calendar year 2013. These efforts will be coordinated with similar activities currently under way at the campus-wide level. All of these projects are cyclical and should continue on an ongoing basis.

**March 2014 Update**

The Division of IT has been participating in campus-wide risk management, business continuity, and disaster recovery activities. Within the division, comprehensive disaster recovery exercises were completed at the end of 2013 and are being conducted on a regular basis to ensure that staff is familiar with the required tasks and that gaps are identified. A revised risk management framework is under development.

**Recommendation 9: IT Governance**

The University of Maryland should develop advisory and communication structures to ensure the continued involvement of the university community in the implementation of strategic recommendations and actions presented in this plan, to support the ongoing operation of information technology resources delivered to the university community, and to improve the flow of information between the central IT organization and the university community in all its forms (faculty members, students, IT providers, staff, and administrators).
Action Item 9.1: University Senate Recommendation for Enhanced IT Governance (9.1a) and New Structures Will Be Created to Serve as a Decision Making and Guidance Body (9.1b)

The university community must be involved as a full-fledged partner with both authority and responsibility in the development and implementation of IT strategies and service directions taken at UMD. A long-term role for the task forces that developed this plan should evolve into a formal governance structure for IT grounded in faculty, staff, and student involvement and integrated with other forms of shared governance at UMD.

IT governance is an ongoing critical success factor for the university. Past governance structures, while effective in some ways, failed to broadly engage the campus community in determining long-term directions for IT enablement and facilitating open and productive communications between central IT, distributed IT support, and the users of IT. The model employed for the development of this strategic plan should serve as a new beginning and starting point for the development of a new model of engagement. The Division of IT, due to the unique role that information technology plays in enabling nearly every function of the university, must have a broad-based and multi-tiered governance structure in order to be effective. Likewise, the diverse aspects of the university community must be engaged in charting IT directions and not simply expect the Division of IT to perform in an isolated manner. The Vice President of IT should work with the community, bringing examples of successful IT governance structures from around the nation and globe, and construct a model that includes faculty governance engagement, student governance engagement, administrative function engagement, and executive leadership.

Category: Baseline Fundamentals

Implementation Strategy

Consult Stakeholders

The University Senate will be engaged to provide a recommendation for enhanced IT governance at UMD. From this recommendation, new structures will be put in place with Division of IT as the moderator for the groups’ ongoing activities. These new structures will serve to be more of a decision making and guidance body than any centralized body has done in the past, so that continual campus input, which began with the development of the IT strategic plan, can drive IT at UMD in a direction aligned with the user community.

March 2014 Update

In Fall 2013, a new IT governance structure for the university began meeting. It is made up of four working groups who will help focus IT initiatives related to learning technology, research, infrastructure and enterprise systems. The working groups were formed by mandate of the University Senate with the help of the Division of IT and are made up of a cross-section of students, faculty, and staff.

Action Item 9.2: Activity Based Costing

In conjunction with Action Item 2.4, the Division of IT should initiate and manage by a program of Activity Based Costing related to its service catalog. This effort should be coupled with a user satisfaction survey so that cost and quality of services can be illustrated and management
decisions regarding funding and program enhancements can be informed by detailed tactical metrics.

To the university community, the costs for services and infrastructure provided by the Division of IT for the benefit of the entire institution have been, to date, veiled and mysterious. Members of the IT strategic planning task forces found the process of engagement enlightening in terms of their understanding of the broader roles and function of the Division of IT. However, this process limited that exposure to only a handful of members of the campus community and did not provide sufficient detail. A unit the size of the Division of IT will certainly benefit from a more detailed analysis of its underlying cost structure (for services) and the sharing of that information broadly throughout its own organization and across the community of its users/customers. The community will benefit by having a better and richer understanding of both the cost and broadly perceived value of Division of IT services, and this will help better inform the advice and direction the community provides to the central IT organization. Such a program should feature not only significant detail of costs and quality assessments, but open access to that information by the community at large.

Category: Baseline Fundamentals

**Implementation Strategy**

Concurrent with development of its service catalog (Action Item 2.4), an organizational taxonomy of all services/operational activities provided by the division will be created and comprehensively catalogued. In conjunction with Action Item 7.6, we will first determine if these activities are in alignment with the current strategic roadmap and will therefore continue. If not, decommissioning those services/systems will be evaluated. Those that will continue will be catalogued and broken down to their most fundamental components for incorporation into the division’s Activity Based Costing (ABC) analysis framework. Concurrent with this work to determine current service/system alignment and disaggregation to lowest level component activities, the framework for the division’s ABC will be developed, which will determine the most efficient and effective means to capture resource costs for each activity, how to rate satisfaction for each, and put in place the structure for evaluating the data in the context of budget development.

**March 2014 Update**

No progress to date.

**Action Item 9.3: Formation of a Research Advisory Council (9.3a) and Create Strategic Plan for Research Computing (9.3b)**

Specifically relating to scholarly enablement, an executive steering committee should be formed to be responsible for the implementation of strategic plan actions related to scholarly enablement. The committee should include the Dean of Undergraduate Studies, the Dean of the Graduate School, the Dean of Libraries, an appropriate rep from the Office of the Provost, and an appropriate representative from the Division of IT.
A similar structure should be developed to coordinate and steer activities related to the implementation of strategic plan elements relating to research enablement.

The structure of the new governance model must acknowledge the role of academic leadership — innovations in teaching come from teachers, innovations in research from researchers — and it must include not only the Division of IT and the Center for Teaching Excellence but also the University Libraries, the iSchool, the Instructional Television Network, the colleges, and other contributors. While these existing organizations will be included, we should also not be inhibited by structures that we have had before or that are in place now. Scholarly enablement in the 21st century requires that we develop new cross-institutional and multi-disciplinary structures to provide a strategic perspective as to how to effectively provide support for faculty development, classroom design, and student engagement in learning and technology. These new governance structures will include responsibility for the implementation of the recommendations and action items pertaining to scholarly and research enablement found in this plan.

Category: Baseline Fundamentals
Implementation Strategy

Consult Stakeholders

A research advisory council should be formed for governance and the creation of a strategic plan to place the University of Maryland at the forefront of research computing. This plan should be multi-disciplinary and provide support to faculty research engagement for researchers and students and enable scientific discovery. The plan should include a comprehensive support model for research computing, an organization to provide that support, and a multi-year plan to constantly improve the physical and human assets needed to move to the forefront of research computing.

March 2014 Update

The Research Steering Committee related to the strategic plan has been formed and has had its first meeting. The Allocation Committee determines operational policy and time allocation for use on Deepthought and Deepthought2. See www.it.umd.edu/hpcc. The Campus Visualization Partnership is steering activities related to the use of visualization on campus. See http://viz.umd.edu.

Action Item 9.4: Faculty Liaison

T The Vice President of IT should place within his senior staff the role of a faculty liaison designed to help the Division of IT leadership to more effectively communicate and interact with the faculty of the University of Maryland. Whether this liaison role is filled by a single individual or a small group of complimentary individuals is a matter for the vice president to determine.

Given that the current Vice President of IT is not a faculty member himself — and that future incumbents in the position may also be “professional CIOs” or faculty removed from active academic roles — and given that the organization itself is not usually populated by experienced members of “the academy,” having an on-staff resource who does provide solid interface with the faculty on a daily basis will have value not only to the continued success of operational and tactical activities of the Division of IT, but also in its interface with a future IT governance structure more tightly
integrated with the faculty. A part-time faculty liaison reporting to the Vice President of IT and interacting as a member of his leadership team (with Deputy CIOs and officers of the Office of the Vice President of IT) can do everything to improve communication with the faculty (i.e., an ombudsman-like role) and also ensure that as new services or elements of IT enablement are rolled out they have been vetted at the earliest stages with a representative of the faculty. This position is not IT governance in its intent — it is much more operational. And whether it is best filled by a single individual or a cadre of faculty providing a broader view of the diverse roles of faculty on campus (teachers, researchers, etc.) can be a decision left to the Vice President of IT based upon the skills and attributes of potential liaison candidates. The liaison should be respected broadly by the faculty, and finding the appropriate individual can be a process informed by leaders in the University Senate, as well as the deans, department chairs, and key IT-centric faculty members across campus. It is recommended that while the role is formal, the process to select the liaison should not be too formal. Also, the term of appointment should be flexible and should be left to the individual liaison and the Vice President of IT.

Category: Baseline Fundamentals

Implementation Strategy

The Vice President of IT will continue to search out willing and able candidates to serve in this crucial role. When an appropriate candidate(s) has been identified and engaged, the mechanics of a semi-formal or formal appointment will be worked out. The VP of IT will develop a plan of action for this liaison(s), which will be complimentary and advisory to the other partnerships including new IT governance, to keep the needs of the campus community at the fore.

March 2014 Update

No progress to date.