



# **Promoting Innovation**

## **The University of Maryland Information Technology Strategic Plan**



**January 2013**



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## FOREWORD LETTER FROM TASK FORCE CHAIRS

Dear Vice President Voss,

As chairs of the four IT strategic planning task forces, we congratulate you on the completed plan, ***Promoting Innovation: The University of Maryland Information Technology Strategic Plan***. This plan articulates a vision for advancement of information technology at Maryland and serves as a complementary document to the university strategic plan. When the planning process began in Spring 2012, the goal was to produce a document that would present a vision for IT excellence that is shared by the many segments of the university population. Having participated in the process, we believe that together we have made real progress towards meeting this important goal.

The quality and broad reach of this document follow from the process you put in place to produce it. You formed four committees to consider different areas of the university's IT needs: Scholarly Enablement, Research and Innovation, Infrastructure, and Resource Allocation and Efficient and Effective Use. We were pleased to serve as the four chairs of these committees. Notably, the committees were not composed of staff from the Division of IT. Rather, each committee was composed of a cross-segment of the university population, including faculty, researchers, administrators, staff, and graduate and undergraduate students. Committee members were suggested by deans, unit heads, and colleagues as being particularly thoughtful, conscientious, and otherwise qualified to serve. Each committee held several meetings to consider the needs of its respective area, with committee members drawing on their own experiences to suggest new ideas. Discussions ranged widely and turned repeatedly not only to the technological enhancements needed, but also to the central role that collaboration and cooperation across different university constituencies would play in bringing about better IT. When these meetings had concluded, we chairs provided you with thoughts and notes to augment those of your own staff who were present at the meetings.

At this point, your team went to work crafting the nine recommendations and the action items attending them. We were pleased to see that the content of the plan does indeed follow from feedback of our respective committees. When various members of the committees called for clarification or re-emphasis of the recommendations, you and your staff adjusted the wording. We were also pleased to see the long, open comment period that followed, and the further improvements made to the document following suggestions from constituencies across campus. Your diligent acceptance of diverse feedback once again demonstrated your commitment to make this document truly the campus' plan.

Now the hard work begins: the vision embodied in the strategic plan must be implemented. This will be a significant challenge. We do not pretend to know the hard choices that must be considered with respect to the university's allocation of funds, but we do know that IT is an increasingly important concern; this plan ensures that IT will be considered seriously and that important priorities will not be neglected. Implementation will also be a challenge, because in order to succeed, it must be truly collaborative, and, most importantly, it must be viewed that way by members of the campus community. The Division of IT must serve responsively, in collaboration with colleges, departments, and unit-level IT staff, to implement the solutions and processes that best support the university's complex academic mission.

In closing, we believe the university has reason to hope that a new day has dawned with regard to the role of IT across campus, and especially with regard to collaboration. You have our support, and the vested interest of the university community, as you advance this well-conceived plan forward. We are counting on you to continue your commitment to see this process to its ultimate and successful end.

Sincerely,

Andrew R. Baden

Donna B. Hamilton

Michael W. Hicks

Daniel P. Lathrop



## FOREWORD LETTER FROM VICE PRESIDENT OF INFORMATION TECHNOLOGY AND CIO

Dear Colleagues,

Information technology is a critical enabler in modern higher education. For nearly two decades, it has permeated every aspect of a university, from contacts with prospective students and interested community members via its website through the information systems that manage collaborative processes of application and enrollment, employment, finances, research administration, and many more. Today more than ever, it has a critical impact on pedagogy, providing the catalyst by which our faculty members explore new ways of teaching and our students engage in broadened approaches to learning. Research in the 21st century also depends on a rich and robust cyberinfrastructure supporting the process of discovery, opening new horizons and expanding the understanding of existing knowledge; and not just for sciences and engineering, but for growing uses in the arts and humanities. We are past the dawn of the digital age and into the full glare of its sunlit midday, and thus we must address modernization, maintenance, and support of the information technology environment to sustain our university's place and recognition as leaders nationally and globally.

Information technology is, in all its forms, but a tool. We focus on various -wares: hardware, software, networkware, etc. But these tools have no impact without the most important component — *humanware*. We rely upon people for the effective utilization of information technology — whether it be those who ensure our fundamental tools and processes are operating effectively and efficiently, those who instruct and help others use these tools, or those who work hand-in-hand with our scholars to create and design new uses for tools in teaching and especially in research. All have their role(s), and all are integral to how well the university achieves success in its broad missions and priorities in scholarly achievement of our students, innovation and entrepreneurship of our faculty and staff, engagement with global impact, and service to our local community.

Critical to Maryland's success in effectively using information technology is to cease to think of it as a luxury or as an auxiliary element, but instead to adopt a view that it is a fundamental asset of the institution, to be provided broadly as a resource across the university in all forms. Crucial to this is the concept of *IT Abundance* — where information technology is current, advanced, readily available, and holistically (yet prudently) funded to meet and exceed the needs of Maryland faculty, students, and staff. The value in an environment featuring IT Abundance is that it redefines what it is possible to do — in teaching and learning, research and innovation, and in the efficient and effective operation of our university. Maryland must embrace the transformative power of information technology, not simply tolerate it; this will be the path to the success of nearly every initiative we undertake in the coming decade and beyond.

**Promoting Innovation: The University of Maryland Information Technology Strategic Plan** is the most comprehensive enterprise IT plan ever prepared at Maryland. It also represents the first such plan to be created by our campus community through an inclusive process that has unfolded over the past year. It is bold and thoughtful in expressing the direction the community wishes to take through initiatives that will advance the information technology environment at the university. Through its nine areas of recommendation and more than sixty action items, it articulates the need to address long-standing needs in the area of baseline IT fundamentals, creates IT Abundance, and provides the foundations that promotes our institution's and campus community of scholars' ability to be truly innovative. I am proud to present this plan on behalf of the community that created it, and I pledge the energy and focus of the Division of Information Technology to further engage with the community in achieving successful outcomes through implementation of the plan.

I would like to express my gratitude to the chairs of the four planning task forces — *Drew Baden, Donna Hamilton, Michael Hicks, and Daniel Lathrop* — for the superb job they did in marshaling the process of gathering and providing comprehensive university input for the plan, and for their leadership in a complicated and often trying task that was accomplished in a matter of weeks. My sincere thanks to the roughly 100 people — faculty, students, and staff — who were on the four task forces and contributed their time, energy, emotion, and experience; it was from these contributors and their engagement in the process that the metal of the plan emerged. I also wish to thank the many individuals from across campus who, while not part of the formal process, took time to review the plan during its 90-day open comment period and who through their contributions, embellishments, and enhancements put the final plan in place that is much stronger from their investment. Finally, to the leadership and staff of the Division of Information Technology, who also participated, engaged, and supported the planning process and gave shape to the plan, I express thanks — and especially to Michael Eismeier, who acted as the “spirit guide” for all through this vitally important process. The University of Maryland owes a debt of gratitude to all of those involved in any way, at any level. The result is truly a remarkable document, which will soon result in an even more remarkable information technology environment at our great university.

**Brian D. Voss**

Vice President of Information Technology and Chief Information Officer





## PREFACE

Information technology is a strategic asset of the University of Maryland that has the potential to empower students, faculty, and staff to achieve all of the collective missions of this great institution. With this in mind, the university community has set forth a vision and a plan for an IT environment that enables the overall success of the university.

Reflecting on potential outcomes described in *Transforming Maryland: Higher Expectations, the Strategic Plan for the University of Maryland*, University President Wallace Loh stated: “The University of Maryland is one of our nation’s great research universities, generating about half a billion dollars a year in external funding. But a great university in the 21st century has to be more than a great research university. It must also be an innovation and entrepreneurship university” that educates tomorrow’s innovators and entrepreneurs and functions in a “globally connected world.”

***Promoting Innovation: The University of Maryland Information Technology Strategic Plan*** is a thoughtful and thought-provoking set of recommendations and action items developed through direct input from university community members to address issues affecting the state of university-wide IT now and for the next five to seven years. Developed with the overall university strategy as its underpinning, the plan delineates how an environment featuring excellent and

abundant information technology will help drive the advancement of the university as a whole. By virtue of the collaborative way in which it was developed, this plan is meant to apply to the entire University of Maryland; the community crafted the plan and is a vital partner in its adoption and implementation. Further evidence of its community-driven nature came when the University Senate overwhelmingly voted to approve and endorse the plan in February 2013.

***Promoting Innovation*** focuses on the “what” and the “why” of planning Maryland’s IT future, describes outcomes that the university community desires as a result of increased IT abundance, foregoes technology specifics that will be handled in follow-on implementation planning, and provides a framework to develop short- and long-term initiatives to support IT advancements for the university community.

As the university’s comprehensive IT plan, ***Promoting Innovation*** serves as the roadmap toward IT excellence, and implementation of its individual action items will provide abundant and innovative IT infrastructure and services at the University of Maryland and beyond. Through this plan, information technology takes its rightful place as a strategic differentiator — helping the University of Maryland to become one of the premier globally networked research universities of the 21st century.



**Promoting Innovation: The University of Maryland Information Technology Strategic Plan** (ITSP) represents the vision and thinking of the UMD community to define the future advancement of information technology at the university. The plan supports the broader vision of the university's strategic plan *Transforming Maryland: Higher Expectations*, as well as the four focused strategic priorities presented by University of Maryland President Wallace Loh: student opportunity and achievement, innovation and entrepreneurship, internationalization, and service to the people of Maryland. The ITSP outlines what outcomes are desired through the deployment of abundant and effective information technology resources and why these outcomes are integral to the survival and growth of the institution.

The ITSP was constructed by the UMD community via a process that established key task forces to focus on general areas of IT impact — scholarly enablement, research enablement, effective and efficient use of resources, and fundamental infrastructure. These task forces were convened by UMD faculty/academic leadership and were composed of faculty, staff, IT professionals, and students who participated in focused brainstorming sessions that generated nine recommendations containing sixty-two specific action items. The nine overarching recommendations are the following:

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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).

The impact of action items contained in these recommendations can be further categorized as follows:

**Actions Providing Baseline Fundamentals:** Those items that must be addressed in order to provide the University of Maryland with the foundational elements of information technology necessary to continue to exist and be successful in the second and third decades of the 21st century. While many of these actions involve a process of continued vigilance to maintain and modernization of existing infrastructure and services, some involve the need for remedial efforts to clear away past and current impediments.

**Actions Creating an Environment of IT Abundance:** Those items that, when addressed, will position the University of Maryland to have an environment where IT is abundant — where it is advanced, current, and

most effectively and efficiently made available to the students, faculty, and staff of the university to aid in their advancement of the broader strategic vision and mission of the institution. These items reflect the manifestation of Maryland's embracing of the transformative and enabling power of information technology.

**Actions Supporting Maryland Being Innovative:** Those items that, when addressed, will position the University of Maryland at the global leading edge as a university that enables scholarly achievement, innovation, and entrepreneurship that comes from discovery and the expansion of knowledge through the use of information technology.

On February 14, 2013, the University Senate voted resoundingly to approve and endorse the ITSP after having had several weeks to read and consider the final version.

The creation of the ITSP is simply the opening chapter in Maryland's advance of its information technology environment. Capturing the "what we should do" and "why this is important" elements via this plan document must immediately be followed by a similar community-involved effort that not only addresses the "how we will do it" but also achieves actual results from implementing the plan's actions. The ITSP should serve as a blueprint to subsequent and ongoing endeavors to achieve the outcomes envisioned by the plan. As such, implementation of the plan's recommendations by addressing associated action items will commence immediately. In so doing, the university will be following an IT roadmap for UMD that capitalizes on the wisdom of the community and the formal endorsement and adoption of the plan by university leadership, giving it an authority that is unprecedented in previous IT strategic planning efforts.





## THE GOAL FOR IT@UMD

In *Transforming Maryland: Higher Expectations*, it is stated that we must “embrace the power of technology to ensure the highest quality of instruction, research and scholarship, and outreach to our alumni and the larger community, and indeed to change the way the world works.” In 2011, UMD President Wallace Loh illustrated such an embrace when he said, “Information technology is the central nervous system of a major public research institution and vital to our state-wide service mission.”

This speaks to the core fundamental principle of **Promoting Innovation** — that to be a successful, thriving, and globally leading university in the coming decades, Maryland must embrace information technology as a strategic asset and not simply tolerate it as an auxiliary liability.

To advance IT as a strategic driver of the institution, the underlying philosophy of our IT strategy is to create an environment where IT is abundant — where it is advanced, current, and most effectively and efficiently made available. “IT Abundance” is therefore a manifestation of Maryland’s embracing the transformative and enabling power of information technology. Thus, Maryland’s strategic goals for its IT environment are the following:

- To provide an excellent and highly valued IT environment that enables the goals of *Transforming Maryland: Higher Expectations* — advancing student opportunity and achievement; enabling innovation, entrepreneurship, and internationalization; and increasing UMD’s service to the people of Maryland.

and

- To be globally recognized as a leader — in absolute terms — in the creative use, application, and provision of information technology.



## RECOMMENDATIONS

The following are the foundational recommendations (goals) formulated from feedback given by faculty, staff, and students who were nominated and/or appointed to serve on one of four IT strategic planning task forces.

### **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.

### **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.

### **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.

### **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.

### **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.

### **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.

### **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.

### **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.

### **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).

## PRIORITIZATION CATEGORIES

The action items supporting the nine recommendations have been assigned prioritization categories. While not an ordinal priority, the prioritization categories reflect whether action items achieve one of the following states:

- A. Baseline Fundamentals:** Those items that must be addressed in order to provide the University of Maryland with the foundational elements of information technology necessary to continue to exist and be successful in the second and third decades of the 21st century. While many of these actions involve a process of continued vigilance to maintain and modernization of existing infrastructure and services, some involve the need for remedial efforts to clear away past and current impediments.
- B. Creating Abundance:** Those items that, when addressed, will position the University of Maryland to have an environment where IT is abundant — where it is advanced, current, and most effectively and efficiently made available to the students, faculty, and staff of the university to aid in their advancement of the broader strategic vision and mission of the institution. These items reflect the manifestation of Maryland's embracing of the transformative and enabling power of information technology.
- C. Being Innovative:** Those items that, when addressed, will position the University of Maryland at the global leading edge as a university that enables scholarly achievement, innovation, and entrepreneurship that comes from discovery and the expansion of knowledge through the use of information technology.



## ACTION ITEMS

Below are the action items supporting each recommendation, which will be the basis on which implementation planning initiatives will be developed and executed by university IT units and appropriate constituents.

### 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

**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*



## Action Item 1.2

**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*

## Action Item 1.3

**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*

## Action Item 1.4

**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*

## Action Item 1.5

**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-**



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**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*

**Action Item 1.6**

**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*

**Action Item 1.7**

**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*

### Action Item 1.8

**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*

### Action Item 1.9

**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 to piggyback 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 disciplines. 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*

### Action Item 1.10

**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*

### Action Item 1.11

**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*



## 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

**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*

### Action Item 2.2

**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*



### Action Item 2.3

**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*

### Action Item 2.4

**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*

### Action Item 2.5

**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*

### Action Item 2.6

**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*

### Action Item 2.7

**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*

### Action Item 2.8

**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*

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### Action Item 2.9

**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*



### 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

**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*

#### Action Item 3.2

**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*





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### Action Item 3.3

**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.

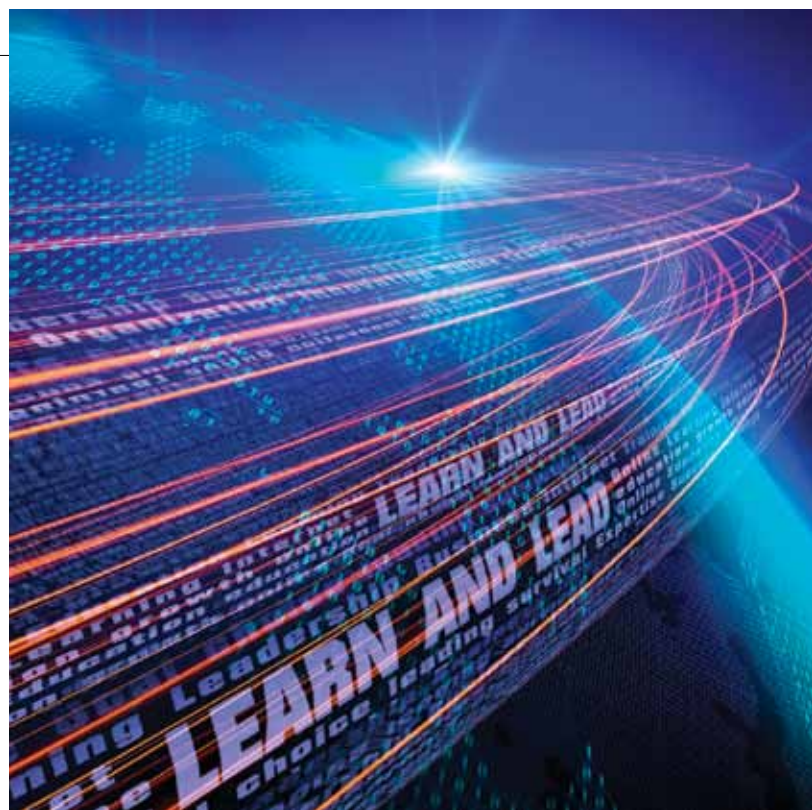
*Category: Baseline Fundamentals*

### Action Item 3.4

**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, any-place, 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*



### Action Item 3.5

**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*

### Action Item 3.6

**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*

### Action Item 3.7

**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*



## 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

**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 (Deeptthought, 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*

### Action Item 4.2

**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*



### Action Item 4.3

**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*

### Action Item 4.4

**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*

### Action Item 4.5

**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](http://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*



## 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

**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*

### Action Item 5.2

**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*



### Action Item 5.3

**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*

### Action Item 5.4

**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*



### Action Item 5.5

**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*





## 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

**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*

### Action Item 6.2

**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*

### Action Item 6.3

**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*



#### Action Item 6.4

**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. Quali 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*

#### Action Item 6.5

**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*



### Action Item 6.6

**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*

### Action Item 6.7

**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*

### Action Item 6.8

**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*

## 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.

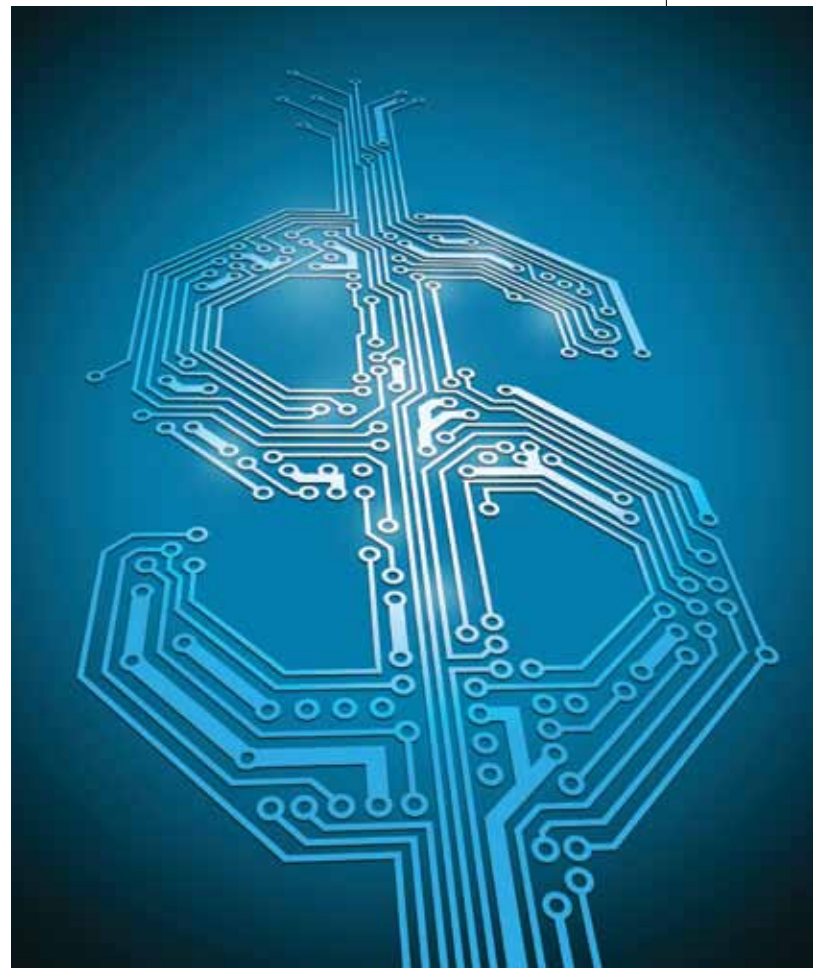
### Action Item 7.1

**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 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*



### Action Item 7.2

**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*

### Action Item 7.3

**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*

### Action Item 7.4

**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*



### Action Item 7.5

**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*

### Action Item 7.6

**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*



## 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

**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*

### Action Item 8.2

**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 Quali 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*

### Action Item 8.3

**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*

#### Action Item 8.4

**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*

#### Action Item 8.5

**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*



### Action Item 8.6

**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*

### Action Item 8.7

**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*

### Action Item 8.8

**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.

*Category: Creating Abundance*



## 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

**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 de-

velopment 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*



### Action Item 9.2

**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*

### Action Item 9.3

**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*

#### Action Item 9.4

**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*





## APPENDIX A

### Scholarly Enablement Task Force

Name	Title	University Affiliation
Donna Hamilton (Chair)	Dean and Professor	Undergraduate Studies
Pamela Abshire	Associate Professor	Electrical and Computer Engineering
Marcio Alves De Oliveira	Research Assistant Professor	Kinesiology
Spencer Benson	Director	Center for Teaching Excellence
Doug Besharov	Professor	Public Policy
Alex Chen	Associate Professor	Urban Studies and Planning
Helene Cohen	Senior Lecturer	Counseling, Higher Education, and Special Education
Philip DeShong	Professor	Chemistry and Biochemistry
Hasan Elahi	Associate Professor	Art
Anand Gopal	Associate Professor	Decision, Operations, and Information Technologies
Chris Higgins	Director	Learning Technologies and Environments
Paul Jaeger	Assistant Professor	Information Studies
Katie King	Associate Professor	Women's Studies
Kevin Mathias	Lecturer	Institute For Applied Agriculture
Dan Navarro	IT Director	Behavioral and Social Sciences
Lara Otis	Librarian II	Libraries
Craig Slack	Assistant Director	Stamp Student Union
Elisabeth Smela	Professor	Mechanical Engineering
Ann Smith	Assistant Dean	Undergraduate Studies
Vinit Parmanand	Graduate Student	
Dan Schuldenfrei	Undergraduate Student	



## Research and Innovation Task Force

Name	Title	University Affiliation
Drew Baden (Chair)	Chair and Professor	.Physics
Millard Alexander	Distinguished Professor	.Chemistry and Biochemistry
Andrew Baldwin	Associate Professor.	.Environmental Science and Technology
Mark Burr	Faculty Research Assistant.	.Physics
Lisa Carroll	Special Assistant	.Division of Student Affairs
Eric Chapman	Associate Director	.CyberSecurity Center
Mike Cummings	Associate Professor.	.Biology
Bob Dooling	AVP for Research, Director, and Professor	.Neuroscience and Cognitive Science Program
Michele Gelfand	Professor	.Psychology
Elisabeth Gilmore	Assistant Professor	.Public Policy
Bill Idsardi	Professor	.Linguistics
Hiro Iseki	Assistant Professor	.Architecture
Maria Pino Martin	Associate Professor.	.Aerospace Engineering
Jeff McKinney	IT Director.	.Electrical and Computer Engineering
Erik Mitchell	Assistant Professor	.Information Systems
Thomas Murphy	Associate Professor.	.Electrical and Computer Engineering
Mihai Pop	Associate Professor.	.Computer Science
Robin Puett	Associate Professor.	.Institute For Applied Environmental Health
Derek Richardson	Associate Professor.	.Astronomy
Greg Silsbee	Chief Operating Officer.	.Shady Grove
Jeff Starr	Independent IT Consultant	
Amitabh Varshney	Professor and Director	.UMIACS
Patty Woodwell	Director Administrative Services	.Graduate Studies
Nevenka Zdravkovska	Librarian III	.Libraries
David Colon-Cabrera	Graduate Student	
Scott Lawrance	Undergraduate Student	

## Infrastructure Task Force

Name	Title	University Affiliation
Michael Hicks (Chair)	Associate Professor and Director	Institute for Advanced Computer Studies and Cybersecurity Center
David Baugh	Coordinator	Information Systems
DJ Bolger	Assistant Professor	Human Development
Karen Breen	Director	Business Services
Saurabh Channan	Faculty Research Assistant	Geography
Robert Gaines	Professor and Associate Dean	Undergraduate Studies
Evan Golub	Lecturer	Computer Science
Babak Hamidzadeh	Associate Dean	Libraries
Cinthyia Ippoliti	Librarian II	Libraries
Joshua Kaplan	Assistant Director	Athletics
Mary Lopez	Coordinator	Public Policy
Mark McGuigan	Coordinator	Public Safety
Don Milton	Professor and Director	Institute for Applied Environmental Health
Fuller Ming	Assistant Director	Dining Services
Trevor Munoz	Assistant Dean	Digital Humanities Research
Chenise Patterson	Associate Comptroller	Comptroller
Pam Phillips	Associate Director	Institutional Research, Planning, and Assessment
Bill Rand	Assistant Professor	Smith Marketing
Ken Riebert	Director, Facilities Administration	Facilities
Ari Schnitzer	Coordinator, Real Estate	Division of Administration and Finance
Ernie Soffronoff	Associate Director	Smith IT
Jack Sullivan	Associate Professor	Plant Science and Landscape Architecture
Jim Zahniser	Executive Director	College of Engineering
Alex Baden	Undergraduate Student	
Vijay Ramasubramanian	Graduate Student	

## Resource Allocation and Efficient and Effective Use Task Force

Name	Title	University Affiliation
Dan Lathrop (Chair)	.Associate Dean Research and Professor	.Physics and Geology
Ritu Agarwal	.Professor	.Decision, Operations, and Information Technologies
Thomas Castonguay	.Professor	.Nutrition and Food Science
Kathleen Cavanaugh	.Assistant Dean	.College of Arts and Humanities
Casey Dawkins	.Associate Professor	.Urban Studies and Planning
Alison Druin	.Professor and Associate Dean	.Information Studies
Kathleen Fominaya	.Assistant Dean	.Information Studies
Ann Holmes	.Business Manager	.College of Behavioral and Social Sciences
Agisilaos Iliadis	.Professor	.Electrical and Computer Engineering
Jeff Kirby	.Manager, PHR Customer Service	.Comptroller
Mike Landavere	.IT Director	.Chemical and Life Sciences
Mona Levine	.Associate Vice President	.Institutional Research, Planning, and Assessment
Jen Patterson	.Associate Director	.College of Arts and Humanities
Steve Pragel	.IT Director	.College of Education
Kevin Remmell	.Associate Director	.English
Sally Rennie	.System Administrator	.Comptroller
David Rivard	.Business Manager	.Libraries
Douglas Roberts	.Assistant Professor and Assistant Dean	.Undergraduate Studies
John Robinette	.Director, Quali Initiatives	.Division of IT
Tony Savia	.Assistant Dean	.Public Policy
Martha Shrader	.Manager, Document Control	.Capital Projects
Jason Strahan	.Director	.Institute for Systems Research
Sue White	.Tyser Teaching Fellow	.Smith School, Finance
Joe Williams	.Coordinator	.Graduate Studies
Adam Jacobs	.Undergraduate Student	
James Neal	.Graduate Student	

## APPENDIX B

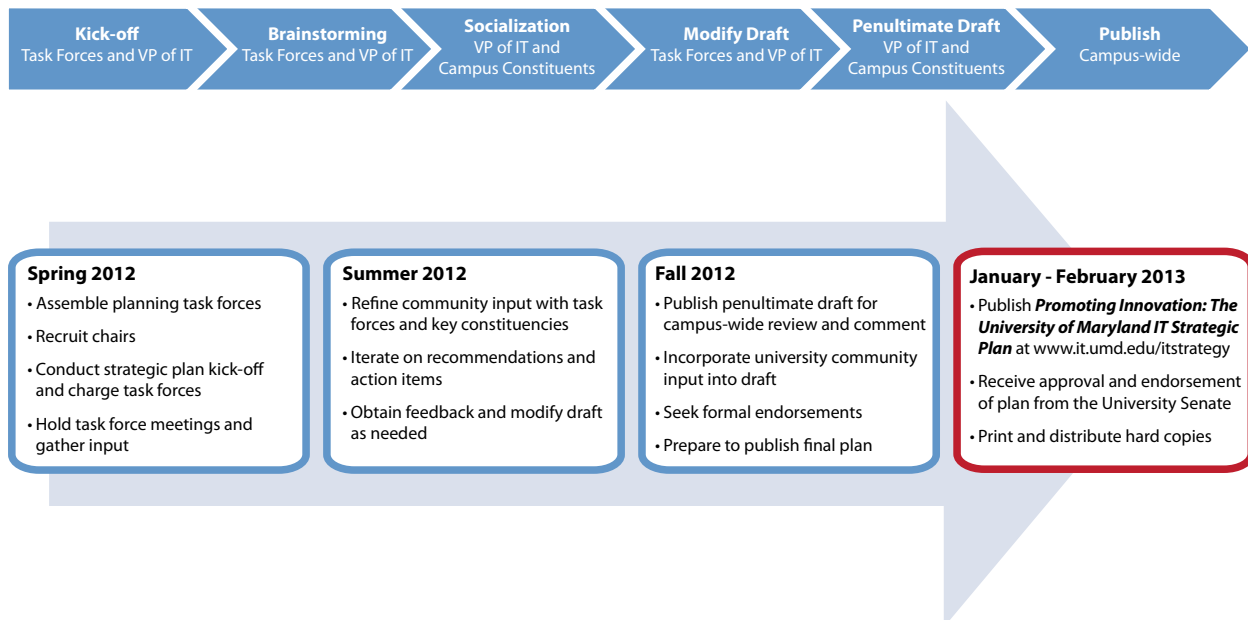
### Process Used in Developing the Plan

Immediately upon his arrival at the university, Brian D. Voss, Vice President of Information Technology and Chief Information Officer, stated among his top priorities the need to craft a campus-wide strategy for IT at the University of Maryland. While an enterprise-wide strategy underpins many organizations, the processes used to devise a strategic plan can vary greatly depending on executives' philosophies. From its inception, the University of Maryland's IT Strategic Plan was to be developed not by input from IT leaders on campus, but rather by the greater university community that carries out the greater university mission and strategies called out in *Transforming Maryland: Higher Expectations, the University of Maryland's Strategic Plan* and through President Loh's further embellishment of the university strategies.

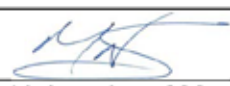
Beginning in late 2011 and into 2012, a vision for why and how the strategic plan would be conceived was communicated to university administration including deans, faculty, administrative leaders, and students. The process would bring together university thought leaders in a myriad of areas of expertise who would be willing to come and brainstorm with fellow colleagues and students about the areas of strategic priority in their departments and day-to-day activities as it relates to information technology. Task forces were assembled with vast participation (100+ members) from across the university.

In spring 2012, brainstorming sessions were held with each of the four task forces. Faculty chairs moderated the sessions and led the discussion through all the topics appropriate for their teams. The dialogue was rich and full of ideas that promise to transform the state of IT at the University of Maryland as an enabler of its broader mission. Sessions were wrapped up before spring commencement, and as faculty, staff, and students proceeded to summer break, Division of IT staff along with the chairs of the task forces coalesced the brainstorming session notes into a draft set of recommendations and action items. This draft was reviewed and edited by task force chairs, and in late summer of 2012, a draft plan was both posted on the Web for campus-wide review and comment and printed and distributed around campus for review.

In preparation for final publication, campus-wide input was solicited and received, and edits were made as a result. Vetting of the penultimate draft was completed with task force chairs in fall 2012. The final vetted plan was published in January 2013, and approval by university administration was then given. The University Senate formally voted to adopt and endorse the plan at its first 2013 meeting, which was held in February.



### SENATE LEGISLATION APPROVAL

<b>Date:</b>	February 15, 2013
<b>To:</b>	Wallace D. Loh
<b>From:</b>	Martha Nell Smith Chair, University Senate 
<b>Subject:</b>	Promoting Innovation: The University of Maryland Information Technology Strategic Plan
<b>Senate Document #:</b>	12-13-35

I am pleased to forward for your consideration the attached legislation entitled, "Promoting Innovation: The University of Maryland Information Technology Strategic Plan." Martha Nell Smith, 2012-2013 Chair of the University Senate, presented the final plan. The University Senate approved the proposal at its February 14, 2013 meeting.

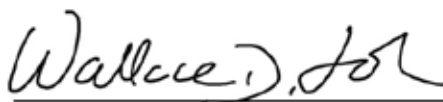
We request that you inform the Senate Office of your decision as well as any subsequent action related to your conclusion.

Enclosure: Promoting Innovation: The University of Maryland Information Technology Strategic Plan

Senate Document # 12-13-35

MNS/rm

Cc: Mary Ann Rankin, Senior Vice President & Provost  
Reka Montfort, Executive Secretary and Director, University Senate  
Juan Uriagereka, Associate Provost for Faculty Affairs  
Terry Roach, Executive Assistant to the President  
Janet Turnbull, President's Legal Office  
Elizabeth Beise, Associate Provost for Academic Planning & Programs  
Sylvia B. Andrews, Academic Affairs  
Brian Voss, Vice President and Chief Information Officer  
Michael Eismeier, Information Technology Planning & Project Manager

Approved:  Date: 02-20-2013  
Wallace D. Loh  
President