

Information Technology Strategic Plan

Western Illinois University

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INTRODUCTION

This Information Technology (IT) Strategic Plan identifies strategies and goals intended to guide the adoption of technologies pertaining to teaching, learning, research, and business processes at Western Illinois University. To the extent possible, it provides broad, overarching directions without attempting to identify specific technology solutions.

Given circumstances and resources at any particular point in time, the University has the option of determining how best to achieve those goals. For example, while encouraging open source adoption, the plan does not specify specific applications. Rather, its intention is to provide a framework and involve the University community in the selection of specific implementation items. Thus, IT governance and this plan are intertwined. The identification of specific solutions, strategies, and goals identified in the IT Strategic Plan are vetted through IT governance. University Technology (uTech) is responsible for the implementation of projects that are approved by this university-wide IT governance process.

The initial version of this plan covered the period of 2013 to 2018. In this time of rapid technological change, five years represents a vast span of time. Therefore, this second update to the IT strategic plan is intended to be both a living document and a rolling plan, revisited and revised by the University Technology Advisory Group (UTAG) on an annual or frequent basis to keep it current. With each subsequent version, it will become broader and more inclusive in identifying future mission critical differentiators and initiatives.

MISSION AND VISION OF UNIVERSITY TECHNOLOGY

University Technology is a division of Academic Affairs at Western Illinois University. Its mission is to provide secure, reliable and high-speed technological infrastructure; an efficient, effective operations environment; integrated information management solutions, and other high-quality, timely services and support to the Western Illinois University community to advance the University's mission while reflecting its core values: Academic Excellence, Educational Opportunity, Personal Growth and Social Responsibility. University Technology's vision is to be a leader among its peers in supporting a connected, modern educational environment. Units within uTech have expanded missions that enable the division and WIU to increase the socioeconomic value of the region, state and nation; thus increase the value of Western Illinois University in furthering its purpose to educate the next generation.

OUR GUIDING PRINCIPLES

University Technology has adopted the following guiding principles and values found in California State University Fullerton's IT Strategic Plan with a couple of additions.

- **Digital First** moves away from paper and paper processing to leveraging processes and tools for sustainable and secure operations.
- **Mobile First** considers and creates applications with functionality considerations first for mobile devices, second for web, and third for desktop presentation.
- **Cloud Ready** considers application and data services first in a private or public cloud while maintaining efficiency, compliance, and security.
- **Enterprise Ready** takes into account the baseline needed by most while allowing for customization when necessary.
- **Data Primacy** looks at deduplication (controlling redundancy and eliminating inconsistencies), validated data, common data sources, and content management to facilitate educated data driven decision-making.
- **Usable and Accessible** looks at making information technology services available to all students, faculty and staff, including those with disabilities.
- **Budget Conscious** looks at reducing operational costs by leveraging/expanding existing technologies or free/inexpensive leading technologies available to us, including open source solutions.

OUR VALUES

- Collaborative & Service Oriented
- Accountable & Transparent
- Innovative & Secure
- Agile & Efficient

RECOMMENDATION 1: ADMINISTRATIVE EFFECTIVENESS

WIU's Enterprise Task Force, working with a consulting firm, has identified SaaS as the platform of choice for its next ERP system. Preparations for eventual migration to a new system now need to be undertaken. These measures include formalizing data governance, documenting our business processes and mapping our data.

Action Item 1.1: Third-Party Enterprise Information Systems Selection

Identify and Implement a Software-as-a-Service platform for Enterprise Resource Planning.

The University engaged the services of an independent, unbiased 3rd-party consulting firm to study and make recommendations regarding its enterprise resource planning (ERP) information systems (or business processes running on the mainframe). In working with the consultants, WIU's Enterprise Task Force concluded that the University should acquire a subscription-type of model (also known as Software-as-a-Service or SaaS) as opposed to purchasing on-premises software and hardware.

Unlike on-premise ERP software, a SaaS ERP is a subscription-based model. The vendor licenses their software to many institutions, which all access the software on the vendor's secure infrastructure through the Internet. This reduces the cost of ownership and implementation time. It provides for predictable ongoing costs and the maintenance and upgrades to the software is performed by the vendor.

- The next steps in the selection process will be to identify a vendor of choice in the SaaS space, seek final approval and funding, and plan for the implementation of the new ERP.
- In the final selection of a SaaS-based model ERP, consideration needs to be given to its data warehouse, analytical reporting and dashboard capabilities.
- It is recommended that the services of a 3rd party cloud access security broker (CASB) also be in place. CASB solutions can provide comprehensive access control, data protection, threat prevention and compliance support.

Action Item 1.2: Data Governance

Document WIU's data definitions in preparation for a migration to a new ERP. This will help reduce confusion associated with varied uses of common terms throughout the University and establish data sharing and usage guidelines.

Data governance includes identifying and defining data elements, ensuring data quality, establishing data ownership and controlling data security and compliance. WIU should take steps to formalize the current data governance processes.

- Having data governance in place will reduce the length of time required for the actual ERP migration. Goals and milestones specific to the migration need to be identified and the project refocused.
- Adequate staffing must be assigned to the project.

Action Item 1.3: Data Warehouse for Historical Data

Data warehouse efforts now need to be focused on historical data.

As noted in Action Item 1.3, it is probable that not all of the historical data will be migrated to the new ERP system. Another solution to this issue is to store it in a Data Warehouse (DW). Because the mainframe may eventually be going away, the DW must be running on WIU servers or in the cloud.

It is preferable that a solution is found whereby historical data can continue to be available or eventually migrated into a data warehouse. The data warehouse project needs to be refocused on preserving historical data and adequately staffed so that when a migration is made, WIU does not have to continue to maintain a mainframe. Currently the DW project only has 1.5 FTE dedicated to it.

Action Item 1.4: Data and Analytics

The SaaS model ERP that is eventually selected may include Data Warehouse, analytics and dashboard capabilities. If not, then the University should move forward with its own data warehouse efforts to support data driven decision-making by making institutional data and analytics more available and actionable. This will be beneficial for reporting off of historical information.

Data warehouses or multi-tenant, cloud-based applications that integrate applications and data in IT environments enable users to generate queries, reports and dashboards. Such products also enable institutions to create mission critical applications that differentiate them from their competition, using data that was previously unavailable to them. For example, predictive analytics are beginning to be used to focus on student engagement and retention, better enabling a wide variety of individuals on the campuses to coach students in educational choices, financial decisions, and personal choices outside of the classroom that impact their educational career. These have the potential to make a significant impact on retention and graduation rates at these institutions.

Action Item 1.5: Preserving Mainframe Performance

Steps need to be taken to preserve performance of the mainframe as long as possible to allow the University to gracefully transition to a new ERP platform

- a. *Before any new application development on the mainframe is undertaken, consideration should be given as to whether the service is available commercially, open source or as a cloud-based (i.e., Internet-based) service.*

Some examples where alternatives for applications that were written in-house for the mainframe include the phone-a-thon, room scheduling, purchasing and roommate-matching applications. These and others should be considered. It should be noted that in some cases, departments have not been able to afford commercial products and therefore have relied on in-house application development for the mainframe. As noted elsewhere, sensitive information shall not be relegated to the public cloud without approval of the IT Governance Council and applicable laws and regulations must be considered.

Administrative Information Management Systems (AIMS) currently seeks input from the mainframe user community regarding suggestions for improvements and new programs. A process within IT Governance (Action Item 10.1) should be used, however, for determining the strategic value of a requested application, whether alternatives are available and on what platform it should run.

- b. *Continue to ensure applications and programs are developed for optimal performance.*

All application development should continue to undergo a formal code review process to help ensure that the program code is optimized for performance as well as to reduce security risks. This will also mitigate the occurrences of loops in order to keep a new program or modified program from looping and draining CPU resources.

Roadmaps should be developed for assisting application developers and programmers to improve their skills in application performance optimization. Because most Cobol applications are not web-based, training needs to be provided for web-based application development. (This relates to Action Item 9.1.)

Action Item 1.6: Seek Opportunities to Eliminate paper processes

Continue to improve all processes across the University by replacing paper forms and repetitive manual effort with digital forms and process automation. Implement pull printing (also known as “follow me” printing).

Reducing the amount of printing at the University will reduce costs and enhance efforts towards becoming more ecology-friendly. Examples of how this can be accomplished include viewing information on monitors instead of a printed format, monitoring of responsible printing and photocopying usage by departments, using Google Apps for Education to share and collaborate on documents electronically, archiving documents electronically using a document repository instead of in boxes, reducing printing waste, etc. An effort to reduce printing must be a collaborative effort by everyone in the academic community, which includes students, faculty and staff.

To better facilitate mobile computer usage and further reduce paper waste, increase document security, and potentially further reduce the number of printers on the campuses, the University should implement Follow Me printing across the campuses.

RECOMMENDATION 2: INFORMATION TECHNOLOGY SECURITY

The frequency, sophistication and severity of cyber attacks, malware exploits and espionage are dramatically increasing... and showing no sign of slowing down. Unfortunately, no one is immune from this onslaught and universities are also being targeted. Adding to the complexity of this backdrop is the trend of bring-your-own-devices (or BOYD) and consumerization (which is the use of personally-owned devices for business purposes). The University must provide the resources to ensure that its network is secure and that it is in compliance with federal and State regulations.

Action Item 2.1: Create a Culture of Security

The University must build a culture of security by training its employees and creating incident response teams and procedures for handling data breaches.

The University must train its employees to be alert for social engineering and phishing attacks. It also needs to create incident response teams and procedures for dealing with potential data breaches. The University should:

- Conduct Phishing for training purposes.
- Provide insider threat awareness training.
- Provide FERPA training to university personnel.
- Include cyber security training related to security awareness for new employees as part of the orientation activities.
- Provide online cyber security training for current employees every three years for increased security awareness.

- Consider introducing a “badging” reward system or certificate for those who complete security training.
- Participate in National Cyber Security Awareness month activities each October.
- Create an incident response plan and train teams to be prepared for dealing with a data breach.
- Invest in training, workshops, cyber-security organization memberships for University Technology personnel who manage WIU’s IT security stance so that they can stay up to date with latest trends and tactics.

Action Item 2.2: Device Management and Security

The University should deploy software solutions to track, secure, and enforce policies on university-owned devices and on personal devices owned by employees that are used to access institutional sensitive information.

“Consumerization of IT is driven by employees who buy their own devices, use their own personal online service accounts, install their own applications and then connect to the corporate network with the device, often without the organization's knowledge or approval (Vangie Beal, Webopedia, 2016).” In the future, this trend may eventually lead to the use of personal devices instead of University-owned devices. This may decrease the funds required to make technology available, but it would also expose the University to added risk due to incorrectly protected devices or the devices falling into the wrong hands.

Therefore, the University should deploy policy, procedures and a software application to track the inventory of mobile devices and manage their security. Tools to discover the location of any mobile or desktop device attached to the University’s network. Every device accessing sensitive institutional data should have security measures enforced and be wipeable if stolen or lost.

Management software is needed so that when a staff or faculty member creates an iTunes account on a University-owned Apple device, he or she is not registered as the owner of the device.

Action Item 2.3: Infrastructure Security

University Technology should continue to enhance its IT security infrastructure and implement strategies to target specific types of attacks.

According to the Poemon report entitled “2016 Cost of Data Breach Study: Global Analysis” (IBM, June 2016), “The biggest financial consequence to organizations that experienced a data breach is lost business.” Attacks are becoming increasingly sophisticated. The University should continue to devise

new strategies and methods to secure the infrastructure in addition to the ones currently deployed.

- Continue partnering with provider(s) for 24X7 real-time network security monitoring, early cyber threat warnings and advisories, vulnerability identification, PCI, and support in mitigation and incident response.
- Provide guidance for the transmission of sensitive information to external agencies.
- Provide at-rest data encryption for clients; offer data encryption at the disk and file level and on all platforms.
- Implement multi-factor authentication for privileged users and those accessing critical sensitive information.
- Improve security training that is required before granting access to student records and financial systems.
- Identify findings from our security partner's assessment that can be mitigated in the short term and make plans to mitigate others in the longer term.
- Deploy DNSSec.
- Limiting access to sensitive data on the mainframe screens and putting the mainframe behind an internal firewall and the BigIP.
- Continue scanning for sensitive information on university-owned desktops and systems.
- Complete the Disaster Recovery capability between Quad Cities and the Macomb campus.

Action Item 2.4: Physical Security

The University should identify areas that can benefit from the use of card key access and video surveillance. Access to technology infrastructure areas, such as the telecommunications/data locations where phone, card swipe, and video surveillance connections are terminated, should be isolated and restricted.

Policies governing the use of video surveillance equipment need to be developed. Also, in many areas, the network switches and cables are exposed to the university community and represent an operational and data security risk. A plan should be developed to secure all network switches and telecommunication cabling terminations.

Action Item 2.5: Unified/Federated Management Framework

The University should have a design, implementation plan, and standard procedures for identity management with changes controlled as strictly as other university critical systems. The University should also participate in an identity management consortium, such as InCommon.

The source of authority for determining an individual's status within the university lies in Human Resources (HR), Provost, and Registrar functions. Using these as sources of authority, automatic provisioning (account creation/activation) and de-provisioning of accounts on various critical University enterprise systems should be triggered by events occurring at the source instead of by University Technology or other entities on the campuses. For example, when a new hire is entered into the HR records as an employee, the appropriate accounts should automatically be created. When that individual's role at the University changes, the appropriate permissions and accounts should be automatically generated. If the individual leaves the institution, all of his/her accounts should automatically be de-provisioned.

The automatic provisioning, granting appropriate permissions and de-provisioning of accounts requires an identity management system. Such a system could also eventually include account provisioning and de-provisioning for services such as card swipe access, ERP access, etc.

RECOMMENDATION 3: IT INFRASTRUCTURE

Information technology plays a role in enabling nearly every function of the University. Its use is dependent on the underlying infrastructure comprised of servers, switches and cables. The network (the switches, routers and cables that transmit electronic signals) is analogous to a highway—it doesn't matter how modern the vehicle is if the highway is inadequate. Given the emphasis upon e-learning, trends towards hosting applications outside the University's data center, increasing demands for use of technology throughout the University, the Bring-Your-Own-Device (BYOD) trend, and the aging switches and cables currently in place, the University needs to address network infrastructure issues in order to meet current and future needs.

Action Item 3.1: Voice over IP (VoIP)

The University should replace its legacy telecommunication system on the Macomb campus with a VoIP system.

Voice over IP (VoIP), which has been a strategic direction of the telecommunications industry, uses computer networks for the transmission of

voice and communication-related data instead of copper wire. Traditional phone switches (PBXs) are no longer manufactured, which makes it increasingly difficult to find replacement components for Western Illinois University's system.

Phone outages on the Macomb campus caused by water seeping into copper cables, combined with the increasingly tenuous nature of the University's aging phone system, further highlight the need to move to VoIP. The Quad Cities campus is currently using VoIP and the Macomb campus has limited VoIP installations (primarily in University Technology, Memorial Hall, and the administrative and courtesy phones in some of the residence halls). The majority of the Macomb campus is relying on a telecommunications system that is antiquated and past its end of life.

Given that WIU has already invested in the VoIP backend infrastructure and has conducted a proof of concept for an open source solution, continued rollout of VoIP requires installation of telephone handsets in offices and upgrading the network in some buildings. Whereas this could be phased in building by building, the potential for costs savings implementing it at one time should be examined. In lieu of desktop VoIP handsets, some universities use the existing desktop computers in offices along with less expensive headsets.

Action Item 3.2: Ownership/Funding of the Network

Western Illinois University's network should be funded with ongoing operating/base resources instead of relying on one-time funding.

The current practice of requiring the colleges to fund upgrades to wires and switches in various buildings has resulted in a network that is not consistent or standard across all areas. For example, the Horrabin wireless network is more robust and modern than the one in the Malpass Library. The student residential network (ResNet), which has a consistent source of funding through student residential fees, significantly outperforms the Macomb campus network in all respects. Ongoing operating/base resources should be established for the upgrade and maintenance of the University's network.

Action Item 3.3: Network Upgrades

A network assessment should be done and enhancements planned building by building for the networks in general.

Given the changing networking landscape, cost differentials, and cost constraints, vendors other than those that have been traditionally used by the University should be evaluated. Adoption of any new technology solution should include training (Action Item 9.1).

- Upgrade the network distribution components (fiber and network equipment) to provide 10 Gigabits per second (Gbps) bandwidth to the core and downstream buildings. This includes upgrading the existing core routers to 40 Gbps, expanded failover capabilities and upgrading the existing remote access gateway (VPN).
- Deploy at least 1 Gbps to every desktop. There is a plan in place to accomplish this in ResNet, but the spending freeze has halted it. There have been several issues with providing this on the Macomb campus, however, such as CAT3 cabling and the use of older network equipment. All CAT3 cabling in all buildings needs to be replaced, which is currently an impediment to the implementation of VoIP.
- Plan to accommodate the demands that the Internet of Everything (IoT) will have on bandwidth and security demands.
- Because the IPv4 network address space has already been depleted, University Technology must test and IPv6-enable WIU's outward facing services.

Action Item 3.4: Equipment Rotation

An infrastructure equipment rotation should be established to ensure that network equipment is not end of life by the equipment manufacturer.

Currently, manufacturers no longer support a significant portion of the University's infrastructure network equipment. An ongoing budget should be established to start updating equipment and cleaning up existing wiring closets that do not conform to current wiring closet standards. This is tied to Action Item 3.2.

Action Item 3.5: Internet Bandwidth

The University should continue to increase Internet bandwidth for both ResNet and the campus networks (Macomb and Quad Cities) by taking advantage of lower costs offered by Internet Service Providers.

The number of wireless devices connecting to the campus networks in Macomb and Quad Cities is increasing rapidly. Furthermore, the trend of accessing applications on the Internet, distance learning and applications that share large amounts of data are placing increased demands on limited bandwidth resources. At the same time, the cost of bandwidth has been decreasing.

The University should formulate a plan to expand Internet bandwidth over time with a goal of reaching 10G in the future. At the time of this writing, the Macomb campus network's bandwidth is 1G and can be expanded to 2G without replacing network hardware. ResNet now has a bandwidth of 3G and can

currently accommodate up to 5G. Quad Cities is now at 250 MB and can go to 375 MB given current hardware. Key components of the network infrastructure will need to be replaced to be able to accommodate increased bandwidth capability.

The new 10G link between the campuses should be considered for possible egress sharing and its use for disaster recovery should continue to be developed.

Action Item 3.6: Wireless Coverage and Saturation

Locations that require robust wireless access need to be identified and infrastructure upgrades should be planned accordingly. This is also related to Recommendation 6 and Action Item 7.4.

As students continue to bring an increasing number of wireless devices and faculty begin to incorporate these devices into their courses, the demand for wireless access availability and network bandwidth will continue to grow. Aging equipment must be replaced and new equipment added to bring it up to current standards and provide the necessary connectivity, throughput and security.

The wireless environment in teaching/learning spaces and heavily utilized green spaces on the campuses needs to be expanded and brought up to modern standards. This could take a few years if undertaken only by University Technology staff due to the number of buildings that need to be updated.

Action Item 3.7: Workstation Power Management

The University should take measures to reduce power consumption of workstations when they are not in use.

The University should automate the process of powering down computers when they are not in use by using the power management functions built into the operating systems, scripts, and/or deploying workstation power management software. Although WIU pays a flat amount to Ameren and will not realize immediate cost savings, this will enhance WIU's efforts to become more green by reducing WIU's carbon footprint. The implemented processes and/or software will turn off computers when they are not in use or otherwise restrict power usage through a multitude of available means.

RECOMMENDATION 4: IMPROVE EFFICIENCIES

The complexity of IT requires the sharing of specialized knowledge expertise across different units... one example is IT security in an evolving networked environment. The

centralization of services and infrastructure also better positions the University to evaluate moves of services and infrastructure to the cloud (Action Item 8.1).

Action Item 4.1: Enterprise IT Governance, Risk, and Compliance Committee within IT Governance

IT Governance should address the importance of risks, effective policies, and practices by creating a formal committee within IT Governance.

An IT Governance Alliance (committee) should be created to include the University's legal counsel and risk officer as well as key University Technology staff to identify and review the laws and regulations that impact the operation of institutional IT resources (or the data contained in those resources); what institutional policies apply to the operation of institutional IT resources (or the data contained in those resources); agreements WIU has made or contracts that WIU has entered into that impose conditions on the use of institutional IT resources (or the data contained in those resources); what resource strategy is in place to address compliance (where possible, compliance investments should be aligned with the institution's risk tolerance and applied where noncompliance poses the largest risk and consequences for the institution); and if there already is a coordinated enterprise-wide compliance initiative at WIU, and can IT compliance activities fit into or help inform the larger program.

Action Item 4.2: Establish a Project Management Office

University Technology should establish a Project Management Office (PMO) within University Technology.

University Technology is an organization that is both project-driven and service-driven. To improve project success rates and implement standard practices in an organization of its size, uTech should standardize its approach to project management and the management of the life cycles and resources across projects. By developing project management leadership and expertise, the PMO could also serve as a resource for the entire University.

The creation of a PMO could initially be accomplished by reassignment of duties of one (or more) of our staff and involve student assistance. A PMO should be equipped with project management tools to track and identify the availability of personnel and equipment resources, as well as provide general project tracking and planning functions. This will assist in the process of planning work and estimating when projects can realistically be expected to be completed.

Action Item 4.3: Focus on Mission Critical Differentiators

IT efforts should continue to become more focused on initiatives that are mission critical differentiators.

Geoffrey Moore's Core/Context model, discussed in his book entitled Dealing with Darwin, suggests that an organization should focus its efforts on mission critical initiatives that differentiate the institution from its competitors. Projects and tasks that are mission critical but non-differentiating, while important to the institution, should be moved to Software as a Service (SaaS), Infrastructure as a Service (IaaS), or Platform as a Service (PaaS) providers if possible. Moore also suggests that the organization spend little or no effort on non-mission critical or non-differentiating items.

The number of systems and applications that University Technology supports continues to increase over time. Supporting an expanding portfolio hampers uTech's ability to undertake new initiatives. While support efforts for voice systems, email and the administration of various computing platforms are important, these initiatives do not differentiate Western Illinois University from other colleges and universities (i.e., these are context but not core).

The University should seek to form partnerships with capable vendors and use cloud options where appropriate to enable the organization to undertake new, mission critical projects that are differentiators (i.e., core) and enable IT staff to provide more direct support to faculty, staff and students. Implementation of ITIL processes will also enable University Technology to refocus its efforts (Action Item 9.1).

This Action Item is also related to Action Items 10.1 and 1.5.

Action Item 4.4: Explore Enterprise Application Alternatives

University Technology should pursue open source, community source, and other no-cost software offerings that are specifically useful in an educational context for enterprise-level use. Where applicable, it should also use software-as-a-service (SaaS) alternatives.

The University should first consider community source or other no-cost software alternatives. This may require the realignment and retraining of some staff resources (Action Item 9.1). Commercial off-the-shelf (COTS) applications or custom-built applications should only be considered if they offer sufficient value or functional advantages and have feasible operational and exit strategies.

Alternatives should also be evaluated through the IT governance process, (as was the case with Microsoft's free antivirus software and Google Apps for

Education). Tradeoffs must be weighed, however, such as the loss of centralized application management, incident response, and the support required to maintain and operate the software. The stability and risk of open source applications should also be ascertained by contacting other institutions using the software when possible.

The University should also leverage applications that are offered as software-as-a-service operating in the cloud (i.e., hosted by a company or vendor and accessible through the Internet... referred “Software as a Service” or SaaS) instead of developing in-house applications or hosting them locally when appropriate. Among other action items, this relates to Action Item 1.6.

The University, through IT governance, must weigh these opportunities against the potential risks and consider laws and regulations including HIPAA, FERPA, GLBA, FCRA, export control laws, the protection of sensitive research and personal data, Section 508, IITAA and comply with applicable Western Illinois University policies. Sensitive information shall not be relegated to the cloud (or SaaS) without approval of the IT Governance Council.

RECOMMENDATION 5: SCHOLARLY ENABLEMENT

Western Illinois University should continue to develop and improve its technological resources that, when used by faculty in effective and innovative ways, have a direct impact on faculty and student scholarly achievement. Also, means should be established for providing faculty members access to classrooms that support presentations using various forms of media for instructional purposes.

Action Item 5.1: Continue to Explore Desktop and Application Virtualization

The University is exploring ways to lessen its dependency on computer labs and administrative office computers through increased use of desktop virtualization.

Western Illinois University should expand desktop virtualization (referred to as VDI) into more learning spaces (including pilots in departmentally-owned spaces in areas such as COEHS and University Libraries).

Desktop virtualization (VDI) is currently employed at Western Illinois University to support some of its computer labs and administrative desktop computing needs.

If VDI becomes ubiquitous at the University, faculty and staff will also be able to access applications remotely or from their offices. While not always initially cheaper than a full desktop PC deployment, it results in savings on support that is

required for traditional desktop computers. VDI will enable Western Illinois University students to access lab applications from their personally owned devices regardless of where they are in the world.

It also provides increased security with more control over data. VDI enables mobile devices to access applications that otherwise would not be accessible on them. Thus, VDI will be driven by the Bring-Your-Own-Device (BYOD) mobile trend (addressed in Recommendation 7 and Action Item 6.2).

Action Item 5.2: Western Online Strategic Steering Committee

The University should form a steering committee to provide overall guidance to its Western Online initiative.

Shifting educational paradigms include online learning, hybrid learning, and collaborative models. New technologies continue to emerge that have impact in this space. Western Illinois University's efforts to support and put more courses online require decisions that have both strategic and day-to-day operational implications. Questions arise that should be addressed by a committee with significant representation from faculty using online learning management resources rather than a few individuals in the technology areas.

This group should be a committee reporting to one of the IT governance groups (Action Item 10.1) or the CIO. A member from CIT will also be appointed to the steering committee to provide faculty input in this process and help CIT to be better aware of technology initiatives in this area.

Action Item 5.3: Distance Learning Platform Alternatives

Allow sufficient time to evaluate distance-learning alternatives and plan for a possible migration to another product.

Western Illinois University's current contract with Desire to Learn (D2L) ends in June 2021. To have adequate time to plan for a possible migration to another platform, the Western Online Strategic Steering Committee (see Action Item 5.2) should form a committee in Spring 2018 to begin the process to determine whether Desire2Learn (and possible new features therein) is meeting our needs or if an alternative would better suit the University.

The committee should also evaluate Google Classroom for faculty and students and enable individual academic departments to provide appropriate level of local administration and support.

Action Item 5.4: Expand and Enhance Electronic Classrooms

All classrooms should have a fundamental and appropriate level of technology.

The previously identified two levels of technology for classrooms should be revised or affirmed by IT governance (Action Item 10:1).

In the fall of 2014, an inventory review was conducted in conjunction with the colleges that identified standard classrooms that were in most need of upgrades. Plans and a schedule for upgrades for rooms without technology, or have outdated technology should be developed.

A roadmap identifying priorities and sequences of upgrades for most or all of the remaining classrooms that lack technology enhancements should be determined through IT governance.

Action Item 5.5: Standardize Existing Electronic Classrooms

Faculty teaching in multiple electronic classrooms should be presented with a uniform, standard method of interfacing with the technology.

Equipment in classrooms should be maintained and refreshed on appropriate, established technology lifecycles. The controls in all of the classrooms should be standardized so that a faculty member teaching in multiple classrooms is presented with the same interface. Students also require consistent interfaces for their own in-class presentations. Standardized electronic classrooms are easier to maintain and support.

The University should strive to equip all or most electronic classrooms on both campuses to support video conferencing, so that classrooms on each of the campuses work together seamlessly. The technology differences between the Quad Cities and the Macomb campuses currently provide a sub-optimal experience because of the involvement required on both campuses in order for the teleconferenced course to be successful. An ongoing dialog should be established with faculty to determine standards that will ensure both campuses have consistent classroom technologies that meet or exceed instructional needs and that provide the same user experience for both instructors and students.

Action Item 5.6: Support Innovation

Western Illinois University should create and support facilities where faculty can test and prototype new and emerging technologies that have potential application in instruction and research.

New and emerging technologies have potential impact on the University's core business of teaching. Western Illinois University should support "sandbox" facilities for the development and adoption of emerging technologies and best practices. Such facilities can also provide a place for faculty to learn to use new technologies. The University should also provide more support for a technology research/resource center either university-wide or for each college – perhaps modeling it off the current technology center in the College of Education and Human Services. Funding should be allocated for new initiatives, testing new network technologies, etc.

Because one of the specific duties of CIT is to investigate the feasibility of a "technology sandbox" for faculty, CIT should be involved in the formulating this facility or facilities.

Action Item 5.7: Mobile Devices In The Learning Experience

The University should strive to support faculty who are incorporating mobile devices in the classroom, through funding (when available), infrastructure upgrades, creation of a mobile computing center, and staff resources.

Faculty members in at least a couple of the colleges at Western Illinois University are experimenting with the use of iPads in traditional and flipped classes. The wireless infrastructure must be upgraded to support the saturation of wireless devices connecting in the rooms they use or plan to use (Action Item 3.6). The expanded use of virtual desktop (VDI) will also support the use of mobile devices in these environments (Action Item 5.1). The new Mobile Computing Center can act as a facilitator and bring the necessary technical resources and solutions together to accomplish faculty-driven projects of this nature (Action Item 7.2).

Action Item 5.8: Create Additional Instructional Computer Classrooms (Labs)

The University should create additional dedicated computer classrooms to support courses.

There is a need for more dedicated computer classrooms with instructor stations. Currently many faculty members do not have access to a classroom with computers in it that they can use all semester long, regardless of the fact that using specific software packages is part of the coursework. Faculty can use a classroom in the Library twice that contains an instructor station without a whiteboard, or Morgan 102 (that contains whiteboards and an instructor station) or Stipes Hall 331 (it has an instruction station and whiteboard) for limited times. This forces the students to move around on the campuses during their semester.

Currently, some rooms are available for faculty looking to use computer labs during teaching sessions. These areas need to offer a complete set of technologies

(software, projection, etc.) and be available as dedicated spaces for classroom instruction.

The use of virtual desktops (VDI) should be expanded into the classrooms. Also, a mechanism should be provided through IT Governance for faculty to provide input when the hardware or software is changed in these rooms.

RECOMMENDATION 6: STUDENT EXPERIENCE/EXPECTATIONS

Prior to their arrival on the campuses, many students have experienced robust technology environments in their homes, high schools, community colleges, and/or other institutions. Familiar with the computers and the Internet since birth, they have grown up expecting a wide array of services and information to be available twenty-four hours a day. Prospective students' first impressions of the University come from their interactions with our website. When they first visit a campus, the availability of technology to them is an important factor. Most students now bring several technology devices and they expect to be able to easily connect them to the University's network and use them in pursuit of their education. The University must strive to meet or exceed their expectations.

Action Item 6.1: Support the Student Life Experience with Technology

Recognizing that technology plays a significant role in students' life experiences outside of the teaching/learning environment, the IT governance process should work closely with students to identify new technologies and IT-related services that support the overall quality of student life experience at Western Illinois University.

Recognizing that the care and nurturing of students extends beyond the classroom, higher education institutions strive to enhance their students' living environments and provide recreational and entertainment opportunities. There is significant value to providing IT-enabled social and entertainment opportunities as well as IT-enabled learning opportunities outside of the curriculum. The University should seek to adopt technologies that enhance student life and that are prudent and safe. A subcommittee of the new IT governance (Action Item 10.1) should be tasked with investigating new opportunities along these lines.

Action Item 6.2: Facilitate Student Ownership of Technology

The University should continue to facilitate student acquisition of hardware and software technologies and services at educational rates or by site licensing.

By virtue of their membership in the university community, students should be extended benefits related to acquisition of personally owned hardware and

software. The student population represents a significant consumer base that the University can use to leverage its buying power. The University should continue to work with its existing IT partners in offering new products and services and seek to form new partnerships that add value to the overall student experience.

Increasingly, the work being produced by students in 21st-century learning environments (across the disciplines) integrates visual and multimedia elements with traditional written work. WIU's access to MS Office and Google Apps allows for the production and organization of work, but lacks the components necessary for creating visual/multimedia elements. WIU should revisit site-licensing options for Adobe Creative Cloud applications (Photoshop, Illustrator, Premiere, et al), which would make these available to all students.

This Action Item, which helps put technology into the hands of students, also relates to the establishment of a Mobile Computing Center (Action Item 7.2).

Action Item 6.3: Campus Portal

The University should provide the university community with a portal system that fosters access to services.

The experience of a university's digital campus is just as important as that of the physical campus. Given that some students who are engaged in Western Online courses may never set foot on our campuses, WIU should have a portal that engages them in the WIU experience. It should also offer on-campus users (students, faculty and staff) these same benefits.

Given that the University will migrate to a new ERP system sometime in the future, it does not make sense at present to invest in a portal that is tied directly to an ERP. However, the University should consider a cloud-based portal that can provide students, faculty and staff access to WIU services through a simple, intuitive search utility. Therefore, such a portal solution should be accessible and mobile-friendly but not directly tied to an ERP.

After decisions have been made and executed in regard to the ERP, the University can build on this by investigating portals that will leverage the information available in the administrative systems. Because the SMAC stack (Social, Mobile, Analytics, and Cloud) is now being heralded as the new foundation, this type of portal should leverage these technologies.

RECOMMENDATION 7: EMBRACE MOBILITY

Given increasing dependence upon mobile devices, the information and processing systems of the future will require mobile application support. Like the banking

transaction trend that utilizes personal mobile devices, individuals should be able to securely conduct university online activities (teaching, learning and conducting business) using any network-connected device, from any location, at any time. Respected organizations, including Gartner, have been talking about this for many years. The University should begin supporting mobility by developing the appropriate safeguards, measures and policies that will keep data secure and compliant.

Action Item 7.1: Build a Network That Supports Mobile Devices

The University should support Bring-Your-Own-Device (BYOD) traffic.

Anticipating that many users in the future may access the University's campus networks with up to four devices (a computer, phone, tablet, and one other IP-enabled device), the University should begin building an infrastructure that supports BYOD network traffic on the University's core enterprise traffic.

Action Item 7.2: Establish a Mobile Computing Center

The University should establish a Mobile Computing Center capable of supporting the use of mobile devices and building applications for use in the educational environment.

Students, faculty and staff in increasing numbers are bringing one or more mobile devices to the campuses. They expect to be able to connect these personally owned devices to the networks and to use them in pursuit of teaching, learning or productivity. The University must develop support for mobile devices, while providing the necessary security to secure and protect information.

It is anticipated that with the creation of a Mobile Technology Center, faculty will have access to development resources that directly impact what they do in their classrooms. It is expected that there will be higher level of engagement on the part of students as they are asked to work in a medium that to them is an integral part of their lives.

Action Item 7.3: Embrace Consumerization (Convergence of BYOD, applications, IoT, etc.)

University Technology should lead the mobility expectations for the University and determine the extent to which it can support this trend while providing appropriate safeguards for security.

Consumerization is the trend whereby information technology appears first in the consumer market and then it is extended into business organizations. Thus, consumer electronic devices are being used in the business environment, resulting in a shift in IT innovation.

- The existing or new ERP should support this trend. Emerging mobile technologies and opportunities should be explored, particularly with regard to student-facing services.
- Appropriate security measures need to be implemented. This will most likely result in the procurement of specialized software for this purpose.
- The concept of a BYOD lab should be explored along with desktop virtualization. Depending on the implementation and results, this could reduce the dependency on labs with University-owned equipment in the future.

Action Item 7.4: Revisit the One-to-one Program

The University should revisit the concept of a one-to-one program.

If the University truly wants to be "digital first," we ought to be moving towards requiring students to have an appropriate digital device. Many colleges and universities have administered one-to-one programs for a dozen years or more. Past attempts at Western Illinois University, which involved a significant amount of effort, failed to yield such a program. It is recognized that not all disciplines may want or need to do this. A careful analysis and dialog involving the campus community should be undertaken in the governance bodies at the University. Plans should be revived, modernized with possible consideration given to smartphones, Chromebooks, or tablet computers instead of laptops. Devices could be issued at discounts or included in tuition if implemented university-wide.

RECOMMENDATION 8: STRATEGIC TECHNOLOGY ALLIANCES

The University should seek to form additional strategic partnerships for externally provided services operating at larger scales. Many services traditionally provisioned on campuses in data centers are now available on the Internet. Examples include email, business systems, learning management systems, etc. These cloud-based (i.e., Internet-based) and other outsourced solutions present economies of scale that can potentially yield substantial economies and savings. They also free up some IT staff resources that can be made available to work more directly with faculty, staff and students. As Western Illinois University moves services to the cloud, it must weigh these opportunities against the potential risks and consider laws and regulations including HIPAA, FERPA, GLBA, FCRA, export control laws, the protection of sensitive research and personal data, Section 508, IITAA, and comply with applicable Western Illinois University policies. Sensitive information shall not be relegated to the public cloud without approval of the IT Governance Council.

Action Item 8.1: Assess Feasibility For Moving Services to Cloud

To reduce high expenditures on hardware, software and IT maintenance, the University should systematically evaluate the feasibility of moving existing services and obtaining new services in the “cloud.” This should include consideration for moving the data center to the cloud as well.

The term cloud refers to a service that is provided via the Internet by a vendor. Another term for this is the public cloud. A private cloud, however, consists of virtualized servers and storage implemented in the University’s data centers. Software that resides in a cloud is often referred to as Software-as-a-Service, or SaaS.

Cloud computing has been embraced because of its ability to eliminate many of the complex constraints common in traditional computing environments, such as space, time, power, and cost. Gmail, Google Docs, Western Online (Desire2Learn) and various other online storage services (such as Dropbox, iCloud, Google Drive and SkyDrive) are but a few examples of public cloud services that most of the WIU community is already familiar with.

Examples of services running in the public cloud and on-premises/private cloud (hosted on servers running in the University’s Data Center), include email and other applications provided by Google Apps for Education, Western Online (Desire2Learn) and the Geographic Information System (GIS). In addition, the Enterprise Task Force is pursuing a SaaS solution for WIU’s next ERP (or business) system.

All Internet-based services (i.e., cloud services) should require approval from the CIO to insure that security of data, firewall, bandwidth and other issues are evaluated before the service is acquired. Adoption of public cloud services opportunities must be weighed against the potential risks and consider laws and regulations including HIPAA, FERPA, GLBA, FCRA, export control laws, the protection of sensitive research and personal data, Section 508, IITAA, and comply with applicable Western Illinois University policies. Sensitive information shall not be relegated to the cloud (or SaaS) without approval of the IT Governance Council.

- The University should also develop a policy that addresses issues pertaining to the use of cloud-based services.
- By 2020, the University should increase the number of cloud applications that support higher capacity/bandwidth protocols by 20%. This includes moving basic and infrastructure services to best-of-breed providers. As of 2016, Desire2Learn, Google Apps for Education (including Gmail), and Microsoft Office 365, which are cloud-based applications, were being used by WIU. In addition, some IT security functions and other server

monitoring functions (such as Pingdom) are being handled in the cloud. Office 365. Some departments also use cloud-based applications such as form hosting, etc.

- Form a committee to research how other universities are using the cloud for data center services and the feasibility and costs associated with moving WIU's data center to the cloud in the future.

Action Item 8.2: Engage with Statewide and National IT-related Organizations

University Technology should seek increased partnerships with IT consortiums and IT research organizations.

Key uTech representatives should participate in state and national organizations and consortiums that facilitate peer-to-peer networking for the exchange of ideas germane to campus technology. University Technology and other IT organizations at WIU should also take advantage of partnerships that support the University's IT efforts through online access to current IT research, tools, advice and project guidance rather than trying to develop new capabilities from scratch. Where possible, telephone access to analysts and researchers should also be sought.

Action Item 8.3: Collaboration with Colleges

University Technology should work with the colleges, other University divisions, and departments to align or realign strategic partnerships.

There are many areas in which University Technology could provide end-user services, such as workshops and training on applications. However, uTech lacks a staff dedicated to such tasks. Likewise, the colleges (for example, COEHS) have personnel (such as technical representatives or tech reps) whose background, skillsets and primary job functions are to provide instructional development services, training and facilities. However, the tech reps time is often monopolized providing services that uTech is trained and adept at providing.

Where feasible, University Technology and the Colleges should open discussions to determine whether complementary skills sets would allow for a reciprocation of services. When agreements can be made, Service Level Agreements or Memorandums of Understanding should include this reciprocity for services that colleges have expertise to complement what uTech is lacking and areas where uTech has expertise to provide that colleges are lacking.

This may also pertain to Action Item 5.6.

RECOMMENDATION 9: IT TRAINING

The University must continue to invest in the training of its IT personnel who support and secure critical IT systems that are core to the University's business.

Learning is the University's core business and it should be a lifelong pursuit of everyone involved in supporting the University's mission. Because the field of technology is complex and constantly changing, ongoing training and development of the IT workforce is essential.

Action Item 9.1: Continue Building and Retaining a Talented IT Workforce

Training roadmaps should be developed for staff in IT support positions and funds provided to implement training plans. New technology implementations must include plans for the staff to acquire the skills and knowledge required for implementation and ongoing support.

The adoption of open source (Action Item 4.2) and restrictions on hiring new positions necessitate that the University maximize the effectiveness of its existing staff resources. Despite limited resources, the University must strive to broaden technical staff's knowledge and keep their skillsets current by providing training and development opportunities. The need for cross training should also be identified and pursued for the development of two-deep IT support of mission critical services.

Appropriate methods of training must be determined for each new technology that is implemented. Options could include online training, books, sending one person to external training and having them serve as a train-the-trainer, and various other opportunities.

Because "IT service management derives enormous benefits from a best practice approach," all directors and managers in University Technology should become ITIL Foundation Class certified (Official ITIL Website). By fostering process maturity within the organization and striving to deliver quality business services, University Technology will become a leader in IT quality services among its peers.

Action Item 9.2: Innovative Recruitment

The University should pursue new and innovative ways to recruit talented IT staff.

The University should develop internal talent by finding ways to invest in bright and promising students. Graduate students can also be assigned to special projects (either by working with the Computer Science Department or paying them as

student workers), helping them to gain valuable work-related experience. Other methods of attracting talented IT individuals from both internally and externally should also be explored. In extenuating circumstances, options for telecommuting should be considered since a physical presence is not required to complete systems work and application development.

- The University should take advantage of advancements in mobility to leverage both local and remote-based professional talent.

Action Item 9.3: IT-related Training University-wide

A University-wide IT training committee should be formed with representatives from the HR areas, the Library, CITR, University Technology, the First Year Experience, and other internal and external resources to offer IT training in the areas of IT security, instructional technology, Web publishing, to students, faculty and staff.

Many departments on the campuses currently offer various IT-related training opportunities. However, there is no university-wide effort to coordinate and streamline these offerings. Nor is there any one group that can determine where gaps in training exist and advocate new types of training and possible venues. Orientations for new faculty, staff and students need to be reassessed as well. Consideration should be given to whether training can be offered online with appropriate progress tracking.

The University should explore methods of helping students acquire the necessary information technology skills required for their success in the learning environments. More than anytime in the past, today's students are better prepared to use information technology resources. These include fundamental resources such as email and word processing applications. Nevertheless, some students entering the academic environment may lack fundamental IT-related skills, such as Excel or keyboarding, and find themselves at a disadvantage. These students face a form of a "digital divide."

- A committee should be formed by the CIO or IT governance to determine where gaps in IT training exist and advocate new types of training and possible venues.

The University should ensure that students are able to acquire the necessary skills for use of IT-resources for success in the pursuit of scholarly achievement. The Instructional/Scholarly Alliance in IT Governance, with its student representation, should examine the need for basic, fundamental IT skills training and implement programs to address these needs. These could include online training opportunities and/or workshops. CIT, which is also charged with assessing the

training needs of faculty (along with CITER) and student technology proficiency standards, should also collaborate on this endeavor.

RECOMMENDATION 10: IT GOVERNANCE

While a formal IT Governance process has been established, it will be relevant that it reflects the changes in the landscape of the University and the needs of the technology community.

Action Item 10.1: IT Governance Continual Improvement

The University should seek to continually improve its IT governance processes.

- Increase participation by the entire University community.
- Seek ways for more involvement by the University community.
- Market the process to new members of the community.
- Through process improvement evaluation, seek to decrease the time it currently takes for proposals to go through the IT Governance process.
- Refine the “Expedite as an Exception” process.
- Thoroughly explain the IT Governance process to help those submitting proposals to reduce misdirection through the process.
- Collect and analyze metrics pertaining to IT Governance processes.

Action Item 10.2: Effective Communication

A faculty, staff, and student should also be appointed from each campus to work with the University Technology senior leadership on a periodic basis as liaisons to help the organization to more effectively communicate and interact with the faculty and students.

The WIU community became involved in the IT decision-making processes through IT Governance. However, IT operational and communication issues are not addressed by that process. Appointing a student, faculty and staff liaison from both campuses in a will provide another forum for the University Technology to reach/communicate with the user base about ongoing operational initiatives. These individuals will be invited to participate in some of the uTech director-level meetings in a non-governance capacity.

One of the faculty members who is appointed as a liaison should also serve as an ex-officio member of CIT to further strengthen the communication processes. In addition, an administrative or civil service employee from Administrative

Services, Student Services, Advancement and Public Service, or Planning should be appointed. The SGAs at the Macomb and Quad Cities campuses should each appoint a student representative. These appointments are intended to foster communication instead of being governance but they will contribute to the overall success of University Technology and they could also serve in the IT governance structure.

The term for faculty, staff, and student appointments, the amount of time needed (perhaps a couple of hours a month), and which governance body makes these appointments needs to be determined.

University Technology will also form a Liaison Committee to better serve its customers. This will be tied to uTech's communication/outreach efforts.

- Appointed uTech directors/managers will serve as liaisons to assigned departments/divisions within the University. They will participate in various meetings in their assigned organizations and serve as a point-of-contact for them.
- Technical Representatives in the colleges also serve as liaisons and will attend the Liaison Committee meetings.
- Regularly scheduled liaison meetings will be conducted with other invited representatives present to advise on priorities and to resolve issues.
- Liaisons will inform their assigned organizations of changes being made by uTech that may impact them.