

UNLV

Information Technology Master Plan



July 2017

A collaborative effort of
University of Nevada, Las Vegas
Strategic Technology Planning Core Team



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UNLV IT Master Plan

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Building the Foundation for a Top Tier Institution

IT MASTER PLAN Executive Summary

Through a collaborative and inclusive process, UNLV's diverse students, faculty, staff, and community members will guide the evolution of the university's transformation to Top Tier status, creating partnerships that provide distinctive educational experiences for students, both in the classroom and beyond.

Through shared governance and informed decision-making, the IT Master Plan aligns information technology initiatives with the mission and strategic goals of the university for a transformative impact.



Top Tier Vision

Enhancing efforts to attract and retain top students and faculty

Educating the region's diversifying population and workforce

Driving economic activity through increased research and community partnerships

Creating a medical school that will become an academic health center for Southern Nevada



IT Master Plan Supporting the Path to Top Tier

- Enhanced Security and Business Continuity
- Support for Innovation
- Coordinated IT Leadership
- Strong Campus-wide Technology Governance
- Administrative Efficiency
- Greater Visibility into All Technology Services

Learn, Work, & Network Anywhere, Anytime

Dynamic, high-achieving students integrate their education pursuits, personal lives, and community connections

IT Master Plan

Creates an untethered UNLV IT environment

- Robust, ubiquitous wireless services
- 24/7 computer labs
- Mobile-first strategy for campus applications
- Virtual IT labs for remote access to academic software
- Fast, reliable network
- Web conferencing facilitates virtual faculty office hours, tutoring, group work
- Support for mobile devices in field instruction
- Online, just-in-time, technical training resources
- UNLV Mobile App annual enhancements

Ease the Business of Being a Student

Students focus their energies on academics and building the connections that foster success

IT Master Plan

Delivers efficient user-friendly IT systems

- Single sign-on student portals facilitate access to the IT systems and the information students need
- Large format printers for conference presentations
- Enhanced security to protect student information
- Easier to find information on UNLV websites
- Digital signage and improved emergency notification
- Self-service HR and Finance options for student employees
- Integrated systems so students update data once
- Seamless IT support services across units
- Print kiosks in multiple campus locations

STUDENTS

Succeed in Top Tier Academics and Research

UNLV motivates students through innovative learning experiences and access to research opportunities

IT Master Plan

Builds an IT foundation to support learning and discovery

- Collaborative IT-enhanced learning spaces
- Improved learning management system
- Increased campus IT internships
- Incentives for innovative mobile app development
- Infrastructure to facilitate cutting edge research
- Analytics to support early academic warnings
- Additional media labs
- Instructor IT Sandboxes for innovations in teaching
- Cutting edge virtual technology in School of Medicine
- Personalized learning technologies improve outcomes

Thrive in a Connected, Supportive Community

Supportive engagement increases retention, boosts learning, and enhances post-graduate opportunities

IT Master Plan

Cultivates student engagement through IT solutions

- Data analytics and reporting tools to assess diversity
- Customer relationship management tools for opt-in targeted student communication
- IT support for students engaged in community partnerships
- IT-enhanced collaboration spaces for students
- Assistive IT for lab and classroom accessibility
- Teamwork tools for group and class projects
- IT to support lifelong student connections
- IT to facilitate special events, debates, athletics
- Social media support to engage UNLV communities

Deepen Academic Excellence

Foster student success through excellence in teaching, innovative learning experiences, and mentoring

IT Master Plan

Provides IT for academic innovation and excellence

- IT leadership to champion emerging pedagogy
- Technology to facilitate cross-disciplinary teaching
- Peer-led faculty development to optimize the benefits of teaching and learning technologies
- Expanded wireless capacity campus-wide
- Analytics to enhance RPC and academic decisions
- Tools for curriculum support and assessment
- Classrooms designed to support active learning
- Enhanced campus learning management system
- Lecture capture services
- Video streaming solutions for instruction
- IT Sandbox, facilitated by user groups, to explore innovations in teaching and learning
- Incentivized technological experimentation in the classroom, laboratory, field, and community

Reduce Administrative Strain

Focus employees' energies on student success, scholarship, and building a Top Tier institution

IT Master Plan

Delivers efficient, user-friendly IT systems

- Automation of labor-intensive administrative tasks
- Document management system to route, approve, and search forms electronically
- Coordinated IT services for cross-disciplinary teams
- Adaptable new employee technology orientation
- Education to assist employees in protecting data
- Technologies to reduce IT security threats
- Cutting edge HR and Finance systems
- New options for automated computer backup
- Expedited new employee access to UNLV systems
- Single sign-on employee portals facilitate access to IT systems and the information staff need
- Tools to effectively manage information overload
- Pre-populated constituent groups for shared access and targeted communication

EMPLOYEES

Stimulate Impactful Research

Create a climate of innovation for high quality, influential research, scholarship, and creative activities

IT Master Plan

Builds an IT environment that enhances research

- Leveraged IT purchasing power for research tools
- Peer-led activities on research technologies
- Incentivizes technological experimentation and innovation in the laboratory and in the field
- Helps investigators comply with IT security requirements (e.g., HIPAA, DoD, Export Control)
- Mobile device support for investigators in the field
- Research data management plan assistance
- Options for storage of and access to large data sets
- Access to institutional profile data for grant proposals
- Expandable, high-speed research network
- Support for research application developers
- New research administration tools and interfaces

Enhance Collaboration

Cultivate a connected and collaborative campus community

IT Master Plan

Employs technology to promote campus engagement

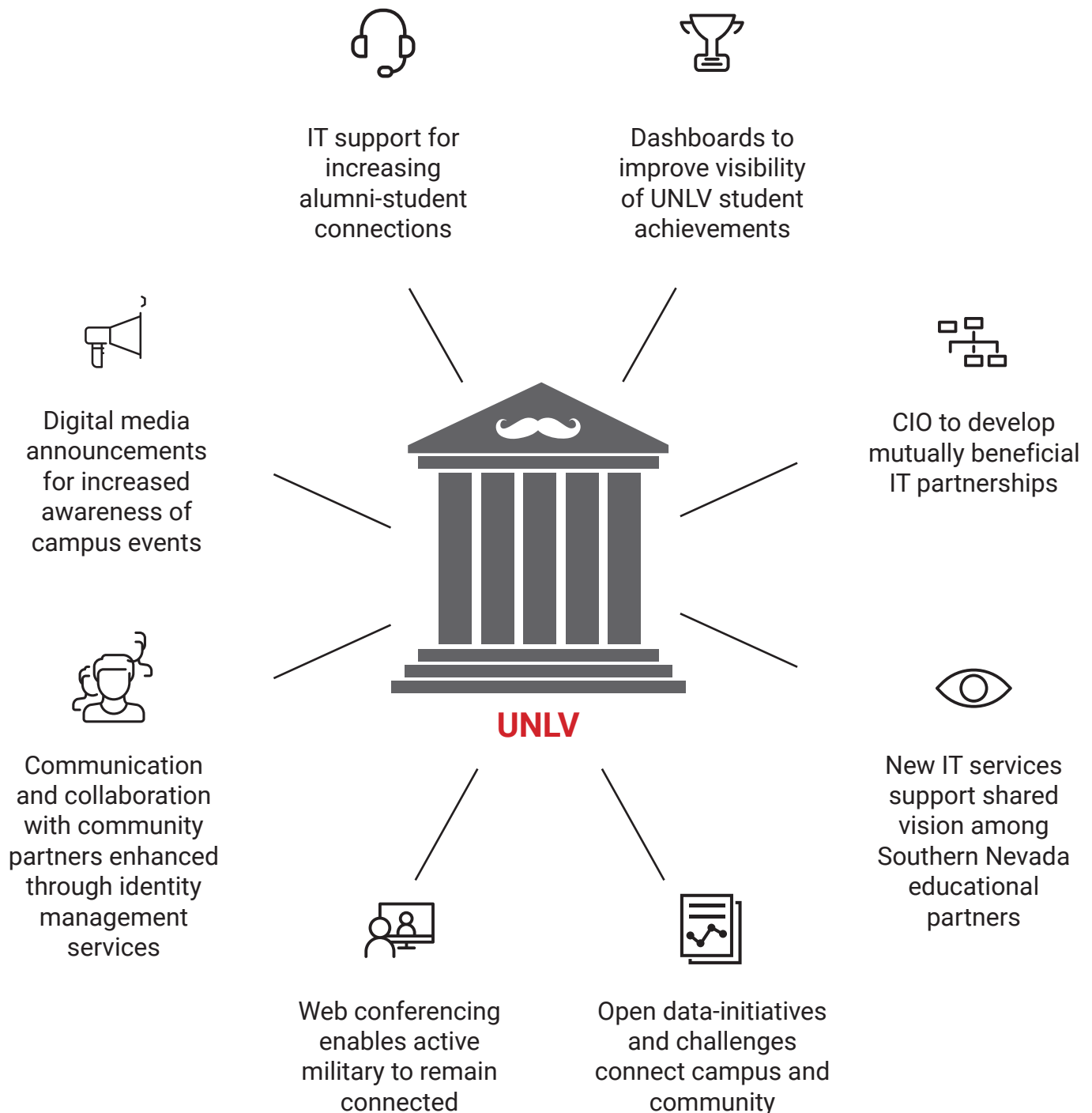
- Data analytics and reporting tools to assess diversity
- Web-conferencing tools facilitate mentorship
- New collaboration tools enhance engagement
- Technologies support employees with disabilities
- Shared technology governance
- Federated credentials expedite cross-institutional collaboration
- Applications to engage targeted constituent groups
- Robust Unified Communication services
- Web page development assistance
- Increased awareness of creative design and collaboration tools available at UNLV
- Training on using multimedia and productivity tools for polished, impactful presentations

Foster Community Engagement

Enrich the cultural vitality of the community by deepening and expanding connections

IT Master Plan

Harnesses IT to empower responsiveness to community needs



ACKNOWLEDGEMENTS

We want to acknowledge and thank the students, faculty, staff, and executive leadership at UNLV for their active participation and cooperation in the planning project. In particular we would like to thank the IT Master Plan Core team members for their many contributions to the planning process and the final plan.

The members of the Core Team met for many hours over the course of several months to provide direction and determine the key areas of focus for the Plan. The Team then worked to articulate UNLV's strategic technology priorities and inform the development of the initiatives that comprise the Plan. Some members of the Core Team have left the university; others have changed roles at the university. The members and the positions they held during their time on the Core Team are included below.

Core Team Members

1. Greg Brown – Vice Provost for Faculty, Policy and Research (Chair)
2. Karen Asquith – IT Portfolio Coordinator
3. Lee Bernick – Interim Dean, Greenspun College of Urban Affairs
4. Shannon Goodman – Interim Associate Vice President, Enrollment & Student Services
5. Michael Gordon – President, Graduate & Professional Student Association
6. Andrew Hardin – Director of the Center for Entrepreneurship and Associate Professor, Lee Business School
7. Patty Iannuzzi – Dean of the University Libraries
8. Shweta Kadam – IT Director, Boyd School of Law
9. Joseph Lombardo – Director, Supercomputing Center
10. Earnest Phillips – Associate Vice President, University Communications
11. Javier Rodriguez – Associate Dean, College of Sciences
12. Michael Sauer – Associate Vice President for Administration
13. Lori Temple – Vice Provost for Information Technology
14. Mohamed Trabia – Associate Dean for Research, Graduate Studies and Computing, Howard R. Hughes College of Engineering

The BerryDunn Consulting Team

1. Clinton Davies – Principal
2. David Houle – Senior Consulting Manager
3. Vienna Morrill – Senior Consultant
4. Josh Clark – Consultant

We would also like to thank the Plan's executive sponsor, John Valéry White, Executive Vice President & Provost, for his support and guidance during the initial planning. In addition, we would like to thank Acting Executive Vice President & Provost Nancy Rapoport and President Len Jessup for their leadership in aligning the plan to support the university's developing strategic directions.

INTRODUCTION AND OVERVIEW OF THE PLANNING PROCESS

Project Background

In February 2012, BerryDunn was selected to facilitate the development of a university IT Master Plan. The goal of the engagement was to design a plan that:

- Addresses evolving technology infrastructure and services needs
- Builds a technology foundation to support future development and innovation
- Ensures the protection of the university's information assets

The IT master planning process was completed in three phases:

1. Current IT environment assessment and benchmarking
2. Creation of the IT Master Plan
3. Revising the IT Master Plan to maintain alignment with evolving university strategic direction

Methodology

Phase 1: Technology Assessment and Benchmarking - BerryDunn brought to the planning process an independent and objective perspective on the current capabilities, resources, needs, and issues surrounding the technology environment at UNLV. The consultants engaged more than 400 students, faculty and staff who contributed their perspectives on the UNLV's current and future technology needs. BerryDunn interviewed over 275 stakeholders in face-to-face meetings, via videoconferences, or by phone. An additional 131 online survey responses were received from students, faculty and staff.

The Current IT Environment Report informed subsequent planning. The report outlined both distributed and central IT services and resources as well as key IT challenges. Additionally, the report contains a list of the strategic IT issues identified during the assessment. The list of issues can be found in Appendix B. The complete report is available at: <https://itmasterplan.unlv.edu/plan>.

During the assessment phase, BerryDunn also conducted peer institution research with the University of Oregon, Arizona State University, and George Mason University. The Information collected has been incorporated into the Plan where appropriate.

Throughout the planning process BerryDunn utilized resources from EDUCAUSE, the recognized thought leader for IT in higher education. Those efforts included periodic reviews of the resources that accompany the release of the annual EDUCAUSE "Top Ten IT Issues" lists. The 2016 Top Ten list is included below.

Top 10 IT Issues, 2016

1. *Information Security*: Developing a holistic, agile approach to information security to create a secure network, develop security policies, and reduce institutional exposure to information security threats
2. *Optimizing Educational Technology*: Collaborating with faculty and academic leadership to understand and support innovations and changes in education and to optimize the use of technology in teaching and learning, including understanding the appropriate level of technology to use
3. *Student Success Technologies*: Improving student outcomes through an institutional approach that strategically leverages technology
4. *IT Workforce Hiring and Retention*: Ensuring adequate staffing capacity and staff retention as budgets shrink or remain flat and as external competition grows
5. *Institutional Data Management*: Improving the management of institutional data through data standards, integration, protection, and governance
6. *IT Funding Models*: Developing IT funding models that sustain core services, support innovation, and facilitate growth
7. *BI and Analytics*: Developing effective methods for business intelligence, reporting, and analytics to ensure they are relevant to institutional priorities and decision making and can be easily accessed and used by administrators, faculty, and students
8. *Enterprise Application Integrations*: Integrating enterprise applications and services to deliver systems, services, processes, and analytics that are scalable and constituent centered
9. *IT Organizational Development*: Creating IT organizational structures, staff roles, and staff development strategies that are flexible enough to support innovation and accommodate ongoing changes in higher education, IT service delivery, technology, and analytics
10. *E-Learning and Online Education*: Providing scalable and well-resourced e-learning services, facilities, and staff to support increased access to and expansion of online education

<http://er.educause.edu/articles/2016/1/top-10-it-issues-2016>

The initial assessment identified challenges consistent with those experienced by higher education institutions across the country. However, UNLV was significantly behind its peers in addressing the issues. Additionally, the assessment identified needs for several foundational IT services not included on the EDUCAUSE list. The Plan provides insight into the nature of these challenges and includes recommendations designed to help the institution meet them. UNLV's progress on addressing the challenges facing all higher education institutions will be one early measure of the Plan's success.

Phase 2: Creating the IT Master Plan - Upon completion of the Current IT Environment Report, BerryDunn met with over 100 faculty and staff in academic units to discuss the findings and refine the needs assessment. Building upon the analysis from the report and subsequent input from the academic units, the consultants worked with UNLV's IT Master Plan Core Team to design and facilitate eight work sessions to gather campus-wide input on meeting the identified needs. Work sessions focused on the following topics:

1. Creating an IT Master Plan and Setting Strategic Vision
2. The Faculty Experience: Teaching and Learning
3. Advancing and Supporting Research: Defining the Technology Resources of a Global Research Institution
4. The Student Experience: Access, Mobility, and Success
5. IT Security: Establishing a Sustainable Model for Protecting Data and Building Security Awareness
6. Addressing IT Services: Defining the Roles and Responsibilities of UNLV's IT Community
7. Creating a Robust Infrastructure: Building the Technology Foundation for a 21st Century Academic and Research Institution
8. Defining the Governance of IT: The Value of IT Governance and How It is Sustained

The work sessions, attended by UNLV subject matter experts, generated ideas that built the foundation of the Plan. Refer to Appendix C for summaries of work session findings.

Although each work session included different constituents and emphasized different topics, redefining campus IT governance emerged as a focal point in all sessions. The work session recommendations have proven both visionary and resilient.

Since the 2013 work sessions concluded, the university has undergone four high-level leadership transitions and two strategic shifts. Nevertheless, although the magnitude of those campus changes delayed the Plan's release, many of the major recommendations emanating from those sessions remain as important in 2016 as they were in 2013.

Phase 3: Revising the IT Master Plan to Maintain Alignment - As the first draft of the IT Master Plan was nearing completion, UNLV entered a unprecedented period of change in campus leadership that led to shifts in the university's strategic direction.

- Fall 2013 - President Smastrek unveiled a new Tier One initiative redefining campus priorities
- December 2013 - President Smastrek resigned
- February 2014 - NSHE Board of Regents appointed Don Snyder as UNLV Acting President
- August 2014 - School of Medicine was created
- January 2015 - President Jessup became UNLV's 10th president
- May 2015 - Tier One Initiative was expanded to a more comprehensive Top Tier Plan

- July 2015 - Acting Executive Vice President and Provost Rapoport replaced Executive Vice President and Provost White
- February 2016 - Diane Chase named UNLV's next Executive Vice President and Provost, effective May 1, 2016

In 2014, Acting President Don Snyder reviewed the IT Master Plan and assisted the team in strengthening the Plan's emphasis on enhancing community partnership. Executive Vice President and Provost John Valery White and President Len Jessup reviewed the Plan in Spring 2015 and elected to delay approval and implementation, allowing time for the Plan to be further revised to support emerging Top Tier strategies. The final version of the Plan represents the best ideas generated over the course of the extended planning period and is fully aligned with UNLV's Top Tier Plan.

TECHNOLOGY VISION AND VALUES

Overview

During the planning process, the Core Team developed a Technology Vision and a set of Technology Values intended to communicate a common purpose for UNLV's technology community. The vision and values also set the direction and tone for the IT Master Plan planning process.

Technology Vision

To support UNLV in its efforts to enhance current technology services and create new services that are innovative, secure, environmentally sound, and cost-effective.

Technology Values

The Core Team adopted the following technology values to help guide the planning process:

- **Collaboration.** The university will build trust through improved communications and delivery of quality services.
- **Leverage.** The university will work towards improving productivity across the IT community.
- **Intentionality.** The university will strive to utilize IT through improved resource allocation, clearer definitions of roles and responsibilities, and supporting redundancy only when necessary.
- **Adaptability.** The university will meet changing needs and address competing IT priorities.
- **Accountability.** The university will demonstrate accountability through a culture of continuous improvement.
- **User-Centered Focus.** The university will establish enhanced user-focused evaluation, assessment, and feedback.
- **Innovation.** The university will be innovative in dealing with risk, discovery, creativity, and experimentation in order to achieve its goals.

RESOURCE CONSIDERATIONS

Resource Considerations

High-level cost estimates for implementing the initiatives are summarized in Section 5.

Securing funding for comprehensive projects is a complex process dependent on a variety of factors including:

- Type of need (e.g., equipment, software applications, staff)
- Nature of the expense (e.g., ongoing, one-time)
- Type of resources available (e.g., state allocations, fee revenues)
- Scope of the project (e.g., one month to three years); and campus priorities

Given the complexities, identifying the source of funding for each action item was not included in the scope of the IT Master Plan development process.

Possible options for securing resources to support the Plan include:

- Leverage and Consolidation
- New Approaches for Providing Current Services
- Strategic Use of Cloud Services
- Decommissioning Existing Services
- More Strategic Use of Existing Funding Sources
- Reallocation of Existing Revenues
- Additional Cost Recovery Rates for IT Services
- Strategic Spending
- New Revenues
- Maximizing Technology and Community Partners

Examples of possible options for securing resources in support of the Plan are included in Appendix D.

STRATEGIC TECHNOLOGY INITIATIVES OVERVIEW

The IT Master Plan is comprised of a set of 14 initiatives grouped by four major areas of emphasis.

IT Master Plan Major Areas of Emphasis	
SECTION 1: GOVERNANCE AND PLANNING	Build a strong governance structure led by a new CIO with the vision to unite the technology community, lead strategic technology planning, prioritize initiatives, and transform IT from a foundational service to a key strategic asset.
SECTION 2: CREATING SUSTAINABLE IT SERVICES	Strengthen processes and practices to improve IT service delivery and usability by coordinating services, sustaining technology investments, and increasing awareness and training.
SECTION 3: FOUNDATION FOR GROWTH AND AGILITY	Create a secure, integrated technology environment with easily accessible, user-friendly enterprise information systems, fewer logins, and increased mobility.
SECTION 4: INFORMATION SHARING AND COLLABORATION TOOLS	Provide technologies that facilitate utilizing information to improve effectiveness, decision-making, communication, and collaboration.

Each initiative is presented using the format below.

Initiative Number and Title	
Initiative action statement. Description of the initiative including why it has value, its relevancy, and its importance to the overall Plan.	
Initiative Owner	Identifies the initiative owner who is responsible for championing the successful implementation of the initiative.
Consultative Role	Identifies other UNLV individuals and/or units that have a consultative role in the implementation of the initiative.
Budget Estimate	
Provides an estimate of direct (e.g., procurement of technology, funding for additional personnel) and indirect costs (e.g., staff time). These costs reflect either projected cost savings and/or cost increases that deviate from current spending levels. <i>Note: All cost estimates are for planning purposes only and are subject to change.</i>	
Action Items to Implement Initiative	
1. Identify high-level steps for successfully implementing the initiative. 2. Provide key milestones for implementing the initiative. 3. Are intended for high-level planning purposes. Some of the action items will require a comprehensive project plan that should be developed in accordance with project management best practices.	
Anticipated Benefits	
<ul style="list-style-type: none"> Includes bullet points that identify anticipated benefits. 	
Measures of Success	
<input checked="" type="checkbox"/> Includes methods for monitoring the success of the initiative. Measures may be either quantitative or qualitative.	
Contextual Information (Research and/or Best Practice)	
Provides information gathered from peer institution research as well as information from Research Universities with Very High Research Activity (RU/VH) and/or sources that support the importance and potential value of the initiative and associated action items.	

A high-level overview of the Plan organized by the four areas of emphasis and the 14 initiatives contained within them is included in the table below.

Strategic Technology Initiatives Table		
Section 1 – Governance and Planning	1. Governance of IT	Establish a governance structure for information technology that is informed by representative groups of campus stakeholders. The structure should facilitate decisions and establish priorities that support UNLV's strategic directions and provide an evolving technology vision that maintains alignment with those directions.
	2. Strategic Technology Planning	Create a sustainable strategic technology planning process that engages the campus community, adapts to evolving institutional priorities, communicates key planning milestones, and aligns with other campus planning cycles.
	3. IT Leadership and Coordination	Establish a Chief Information Officer (CIO) position at UNLV that provides a technology vision, aligns IT efforts with strategic initiatives, leads IT service delivery, and facilitates IT planning efforts across the university's community of central and distributed IT personnel.
	4. IT Projects	Establish IT project review and purchasing approval processes that maximize UNLV's IT investments. These new processes will facilitate the deployment of new services, improve IT service coordination, and provide transparent decision-making.
Section 2 – Creating Sustainable IT Services	5. IT Service Coordination	Improve the coordination of campus IT services by developing an IT Service Portfolio and an IT Service Catalog to optimize both distributed and centralized technology services.
	6. Sustaining Technology Investments	Sustain both distributed and central IT investments, optimize technology refresh cycles, leverage technology standards, and support the introduction of new and emerging technologies. Design funding models to support a strategic approach to sustaining technology.
	7. IT Awareness and Training	Increase awareness of available IT services, strengthen technology training, and provide timely, targeted communication about technology.

Strategic Technology Initiatives Table		
Section 3 – Foundation for Growth and Agility	8. Information Security	Elevate the role for security planning and management beyond IT by creating a university-wide Cyber Security Team and Chief Information Security Officer position empowered to implement a comprehensive security strategy designed to mitigate current and anticipated future risks.
	9. iNtegrate 2	Implement new human resources and finance systems to reduce labor-intensive manual processes, decrease duplication of effort, improve tracking, and increase self-service options. The new systems are designed to integrate well with existing applications, improve data integrity, enhance security, and provide better access to information for decision-making and reporting.
	10. Identity Management and Single Sign-On	Establish an identity management program to improve the efficiency of user account administration, increase information security, improve collaboration, and simplify access to resources and data.
	11. Mobility	Meet the growing expectations for mobile access to information and services in a manner that is expeditious, secure, sustainable, and focused on improving university services.
Section 4 – Information Sharing and Collaboration Tools	12. Enterprise-wide Document Management	Establish a university-wide approach to digital document storage, electronic workflow, records retention, and secure disposal of archives that will support the university's goal to increase administrative efficiency.
	13. Leveraging Institutional Data Management	Build upon the institution's university-wide support model for improving access, utilization, and governance of data that recognizes the strategic value of using information as an institutional asset.
	14. Communication and Collaboration Tools	Cultivate a more engaged, connected, and collaborative campus community through the use of state-of-the-art technologies.

ENABLING THE UNLV MISSION

UNLV's Mission Statement

UNLV's diverse faculty, students, staff, and alumni promote community well-being and individual achievement through education, research, scholarship, creative activities, and clinical services. We stimulate economic development and diversification, foster a climate of innovation, promote health, and enrich the cultural vitality of the communities that we serve.

UNLV's Core Themes

The core themes of UNLV, the objectives, and their indicators of achievement, express the mission of the university. The core themes describe in broad statements what UNLV plans to accomplish and reflect the values that are shared by faculty and staff. Evaluation of the metrics associated with the indicators of achievement will demonstrate how effectively UNLV is carrying out its mission.

- Core Theme 1: Promote Student Learning and Success
- Core Theme 2: Advance Research, Scholarship, and Creative Activity
- Core Theme 3: Foster a Diverse Campus Population and Engagement with the Community

Enabling the UNLV Mission

The IT Master Plan includes initiatives and action items designed to further UNLV's mission as expressed in the institution's Core Themes. In addition, the Plan is designed to align with UNLV's Top Tier vision to be " . . . recognized as a top tier public university in research, education, and community impact."

The Enabling the UNLV Mission view of the Plan highlights how the Plan creates a technology foundation for achieving each core theme and supports key top tier objectives associated with each core theme.

UNLV IT Master Plan: Enabling the Mission	
<i>Section A:</i>	Provide technology services to Advance Research, Scholarship, and Creative Activity
<i>Section B:</i>	Provide technology services to Promote Student Learning and Success
<i>Section C:</i>	Provide technology services to Foster a Diverse Campus Population and Engagement with the Community

Each section includes:

- An overview of the university's strategy to meet each theme's objectives
- Highlights of how each initiative provides technology changes to support the theme
- Additional action items to meet core theme needs

A. Advance Research, Scholarship, and Creative Activity

Provide technology services to advance research, scholarship, and creative activity.

In August 2013, UNLV unveiled the Tier One initiative, a multi-decade strategy for becoming a top 100 American research university by attaining a Carnegie Foundation designation of "Research University/Very High" (RU/VH). In extensive campus planning sessions over the past two years the Tier One initiative has been honed, expanded, and renamed. The new Top Tier strategic plan reaffirms the university's commitment to attaining Carnegie's highest research classification by 2025. The new strategy also delineates plans to meet UNLV's equally vital role in enriching the quality of life in Southern Nevada.

UNLV's Academic Health Center initiatives are the largest and most salient Top Tier efforts to attain the highest research classification and to provide essential services to Southern Nevadans. The Top Tier roadmap includes specific goals and success measures to guide UNLV's efforts to advance research, scholarship, and creative activities over the next decade. A high-level summary of key measures of success on that roadmap are included in Table A-1 below.

Table A-1: Top Tier Key Measures of Success

Research, Scholarship, & Creative Activity	Academic Health Center
<ul style="list-style-type: none"> • Carnegie Research University/Very High status • \$150 million annual research expenditures • 120 new non-faculty PhD researchers • 5% research commercially sponsored • 200 doctorates per year (60% increase) • Increase depth and breadth of student participation in research • Increase in intellectual activity, patents, and entrepreneurial activity fostered by UNLV • University-wide infrastructure developed to support research, scholarly, and creative activity 	<ul style="list-style-type: none"> • \$48 million research grants and contracts • 120 new faculty, physicians, and scientists • Research excellence in five key areas: mental health and addiction, neuroscience, oncology, cardiology, and orthopedics • Serve as a model for interdisciplinary team research that engages clinical health professionals, basic scientists, and community health professionals • Interdisciplinary research groups that optimize use of technology in health care • Expansion of clinical research trials in Southern Nevada • Creation of next-generation health sciences library

The campus is making steady progress towards creating a university culture that augments and accelerates interdisciplinary research in areas closely tied to the UNLV mission and the State of Nevada's plans for economic development. UNLV's Top Tier Research, Scholarship, and Creative Activity and Academic Health Center teams have identified several changes that will build an environment more conducive to achieving the university's research goals. Those plans include:

- Increasing collaboration
- Improving institutional support for investigators pursuing grants
- Re-architecting research infrastructure, space, and services
- Elevating customer service

A. Advance Research, Scholarship, and Creative Activity

- Providing mentorship for both faculty and students involved in research

As the teams prioritize resources to achieve these enhancements, engagement with campus technology governance groups is highly recommended. UNLV's technology architecture must be designed to offer a solid foundation for the university's planned growth.

Many of the changes recommended to improve UNLV's research environment require a corresponding elevation and adjustment of IT infrastructure and services. Evolving methods of research, scholarship, and creative activity place greater reliance on the utilization of external digital resources, require extended resource sharing with broad multi-institutional collaborations and consortiums, and utilize increasingly resource-intensive forms of data (e.g., large data sets, video, interactive data, simulations). Seamless connection to these new scholarly resources requires supporting upgrades in network infrastructure, storage, software, authentication, and IT security. Additionally, lab upgrades and new types of collaboration spaces depend on changes in the underlying technology.

Whether one's vision of a lab includes state-of-the-art tethered research spaces with network-aware sensors that phone home status updates to maintain a precise laboratory environment, specialized technology for set design changes in the fine arts, high-capacity computers for data analysis, or increased use of video monitoring, research spaces are increasingly dependent on a wide range of new technologies. Even researchers who envision the optimal research space as a completely untethered lab using mobile technology to bring their tools to the field, require underlying technology adaptations to ensure their labs meet research compliance requirements.

Research strategic planning. The campus is also in the early stages of developing a comprehensive Research Strategic Plan that will move UNLV closer to realizing its goal of achieving the Research University/Very High (RU/VH) designation.

In addition to articulating how UNLV will achieve the desired RU/VH designation, a comprehensive research strategic plan must address the needs of individual faculty members and the students they mentor in the field and in their laboratories, studios, and classroom. The plan must also ensure the campus objectives laid out in the UNLV Core Theme focused on research, scholarship, and creative activity are met. Finally, the research plan must address the growing reliance on the technology needed to support all aspects of research activity.

Providing the technology environment. The initiatives in the UNLV IT Master Plan contain numerous action items designed to build a technology environment that:

- Provides a foundation for enhancing research, scholarship, and creative activity
- Enables individual scholarly pursuits of faculty, students, and staff
- Supports Top Tier goals
- Adapts to accommodate the new directions that arise out of the Research Strategic Plan

Table A-2 describes how action items within each IT Master Plan initiative provide specific support for research, scholarship, and creative activity. Detailed information about each of the action items, including outcomes and interdependencies, are described in the full initiative. A summary of the timeline and resources required for these action items can be found in Section 5.

A. Advance Research, Scholarship, and Creative Activity

**Table A-2: UNLV IT Master Plan
Advances Research, Scholarship, and Creative Activity**

Initiative	Research, Scholarship, and Creative Activity Support
#1 Governance of IT	Includes a research representative on the Technology Advisory Committee
	Includes two committee members representing research on the Technology Review Board
	Creates a Research Technology Group to prioritize and coordinate technology needs
#2 Strategic Technology Planning	Ensures the IT Master Plan aligns with the evolving Top Tier research initiatives and the new Research Master Plan
	Fosters long-term planning to build an IT environment that makes UNLV appealing to new investigators and helps generate new grant opportunities
	Balances long-term planning with the creation of an agile IT environment capable of responding quickly to the needs of newly funded research
#3 IT Leadership and Coordination	Provides a CIO position that advocates for campus research activities and supports the efforts of the Vice President for Research and Economic Development
	Charges the CIO with developing relationships with local, state, regional, and federal agencies to understand changes in technology that impact research
	Fosters collaboration across the IT community to better support research initiatives
	Broadens UNLV's involvement with Internet2 and other technology consortia
#4 IT Projects	Ensures IT procurement and project prioritization processes accommodate research needs
	Includes research representatives in the IT project prioritization processes
	Leverages IT purchasing power for research tools
	Establishes technology standards and designs IT architecture for quicker deployment of research technology
#5 IT Service Coordination	Catalogs all campus IT services to identify technology resources available to investigators
	Incorporates research technology services in the IT Service Catalog
	Coordinates IT services to meet specialized research needs
	Establishes service level agreements for research technologies
#6 Sustaining Technology	Develops a funding model to maintain and renew grant-funded equipment
	Updates IT infrastructure, enabling investigators to rapidly implement new

A. Advance Research, Scholarship, and Creative Activity

Investments	technologies
#7 IT Awareness and Training	Expands just-in-time online and in-person technical training for research technologies
	Promotes peer-led professional development activities focusing on research technology
	Incentivizes technological experimentation and innovation in the laboratory and in the field
	Provides targeted information about IT issues relevant to investigators
#8 Information Security	Includes a research representative on the Cyber Security Team
	Assists investigators in identifying and mitigating risk associated with collecting, storing, and sharing research data
	Implements backup services to ensure the protection of research documents and data
	Helps investigators comply with IT security requirements (e.g., HIPAA, DoD, Export Control)
#9 iNtegrate 2	Reduces labor-intensive administrative processes (e.g., hiring, travel, procurement) allowing investigators to focus on their research
	Implements a grants and contracts module for more effective management of grant funds
	Supports interfaces between human resource and finance administrative systems and research administration tools
	Improves investigators' access to research budget information
#10 Identity Management and Single Sign-On	Expedites cross-institutional collaboration via federated credentials for authorization and access to shared research resources through the InCommon Federation
	Simplifies access to research resources and library collections at other institutions
	Expedites the provisioning of credentials for access to university applications and data
	Facilitates interdisciplinary research collaboration through role-based security
#11 Mobility	Increases mobile access to research-related information and services
	Supports investigators using mobile devices in the field
	Supports researchers developing and/or acquiring mobile applications
	Expands wireless capacity in research facilities
#12 Enterprise-wide	Increases ability to search for electronically-routed research data and documents
	Provides automated records retention compliance for research documents

A. Advance Research, Scholarship, and Creative Activity

Document Management	Assists with e-forms creation, electronic data capture, and automated workflows to increase research administration efficiency
#13 Leveraging Institutional Data Management	Creates dashboards showing progress towards achieving Top Tier research and Academic Health Center goals
	Adds research data to the campus data warehouse to allow cross-functional reporting
	Facilitates the development and implementation of research data management plans
	Expands access to data analytics and reporting tools
	Improves access to institutional profile data used to support grant proposal development
#14 Communication and Collaboration Tools	Increases visibility into research activities across key audiences
	Improves communication with appropriate constituents through targeted messaging
	Increases teamwork, productivity, and administrative efficiency among research teams by maximizing the utilization of existing and new communication and collaboration tools
	Implements web-conferencing and Unified Communications to facilitate team collaboration

While each major initiative in the Plan includes action items that will enhance the infrastructure and business practices that support the advancement of research, scholarship, and creative activity, additional needs that did not fit squarely within those initiatives have also been identified. Table A-3 provides a brief summary of additional action items to meet the needs identified in the UNLV Current Information Technology Environment Report, the follow-up work sessions, and the leadership team review.

Table A-3: Additional Action Items that Advance Research, Scholarship, and Creative Activity

Type of Need	Recommended Action Item
Data Management	Develop options to support research-specific data management needs (e.g., archiving, curation, accessibility, rights management, security)
Data Storage	Provide options for storage and access to large data sets (e.g., created by investigators, acquired from other sources, available commercially)
High-speed Connectivity	Partner with System Computing Services and Switch Communications to provide multiple options for high-speed connectivity for investigators
Research Network	Re-architect the UNLV network core to support a virtual, secure, expandable, high-speed research network

A. Advance Research, Scholarship, and Creative Activity

Support for Data Scientists	Provide the technology infrastructure and services needed to support data scientists (e.g., high-speed connectivity, analytic tools, programmers, statisticians)
Technical Support	Increase the number of programming staff to support the development of research applications
Research Administration Tools and Interfaces	<p>Implement new and/or enhance research administration tools to support:</p> <ul style="list-style-type: none"> • Animal protocols • Institutional Biosafety Committee (IBC) protocols • Conflict of Interest tracking • Export Control management • Tracking foreign travelers and visiting investigators • More effective interfaces between the major research administration applications • Grant acquisition and management • Integrations with the new human resources and finance systems

B. Promote Student Learning and Success

Provide technology services to promote student learning and success.

Top Tier institutions couple highly productive research, scholarship, and creative activity programs with strong academic programs focused on ensuring student learning and success. UNLV's student success initiatives are broadly articulated in the institution's Core Themes and quantified in the Top Tier plan.

Meeting student learning and success objectives. Over the last four years UNLV has embarked on several major multi-year initiatives designed to promote student learning and success:

- I. Provide a high quality teaching and learning experience
- II. Recruit, retain, and graduate an engaged and diverse student body
- III. Advance graduate education to promote student learning and achievement

I. Provide High Quality Teaching and Learning - Critical to increasing the quality of teaching and learning is a major revision to the general education requirements for undergraduates. The reform began in 2011 when UNLV adopted a set of University Undergraduate Learning Outcomes (UULOs) and four new elements of undergraduate education to support achieving the outcomes. Table B-1 summarizes the four-year roll out of the new undergraduate curriculum.

Table B-1: Summary of General Education Reform Requirements

Initiated	Element	Reform Requirements
2012	First-Year Seminar	<ul style="list-style-type: none"> • Introduction to college life • Exposure to broad expectations within a discipline • Initial experiences in achieving UULOs
2013	Second-Year Seminar	<ul style="list-style-type: none"> • Reading and writing intensive courses • Emphasis on advancing skills introduced in the first year
2014	Milestone Experience	<ul style="list-style-type: none"> • Experiences that introduce students to their chosen degree program • Orientation to learning outcomes in the chosen degree program • Reinforcement of communication and critical thinking skills relevant to the degree
2015	Culminating Experience	<ul style="list-style-type: none"> • Consolidates, reinforces, and assesses both the degree-specific learning outcomes and the broader UULOs

II. Recruit, Retain, and Graduate an Engaged and Diverse Student Body - In May 2013, students, faculty, and staff gathered at the first annual Retention, Progression, and Completion (RPC) workshop. The workshop laid the groundwork for a university-wide strategic plan to enhance student success by addressing recruitment, retention, graduation, and diversity challenges. The 2014 RPC workshop highlighted progress on the overall plan and focused on activities undertaken by academic units to create data-driven approaches to improve student success and increase UNLV's six-year graduation rate. The focus of the 2015 RPC workshop was on how individual faculty members can contribute to student retention and completion efforts. Together the institutional, unit, and faculty initiatives are helping meet student success and diversity efforts in support of accreditation requirements while also increasing graduation rates in support of Top Tier key milestones.

III. Advance Graduate Education – UNLV's Graduate College has adopted a new comprehensive approach to attract and retain graduate students called the Grad Rebel Gateway. Aided by the adoption of new constituent management tools, the new approach emphasizes individualized service, increased

B. Promote Student Learning and Success

efficiency, digitally-based interactions, and better tracking of information. The new approach also provides valuable data to help determine which efforts are having the most impact on student success. Across the institution new doctoral-level programs in high-demand disciplines are being developed within the academic units. Schools and colleges are also working to increase the number of masters and doctoral assistantships as well as compensation.

Additional efforts to advance graduate education include new doctoral programs in several health-related disciplines and development of the UNLV School of Medicine. The school's revolutionary approach to medical education - community-based, experiential, leveraging state-of-the-art virtual technologies - is receiving enthusiastic support from constituents across the state. New levels of technology planning and coordination are required to support this visionary approach to preparing students for success as health practitioners.

Together these three major initiatives – curriculum reform, student engagement, and advances in graduate education - are designed to meet essential elements of UNLV's mission related to education. Additionally, the campus has recently revised the Academic Master Plan. The plan outlines programmatic and curricular changes that will help attract competitive students in-state, nationally, and internationally and will meet state and regional needs for degrees that address economic development issues.

Meeting Top Tier student achievement goals. The initiatives described above are critical for achieving the educational components of the university's multi-decade Top Tier plan. A summary of key educational milestones within the Top Tier plan is shown in Table B-2.

Table B-2: Top Tier Student Achievement Measures of Success

Student Achievement Measures of Success	Academic Health Center Measures of Success
<ul style="list-style-type: none"> • 50% six-year undergraduate graduation rate • 80% Freshman-Sophomore retention rate • 12-month, 7-day a week campus community • 200 doctoral degrees granted annually • 25% of financial assistance for students in graduate and professional programs from external resources • Reform General Education • Meet enrollment targets for in-state and out-of-state students • Enhance student mentoring and advising • Utilize learning assessment and outcomes data to make programmatic changes • Decrease student-to-faculty ratios • Implement a consistent set of tools to evaluate teaching effectiveness • Increase support for underrepresented students, faculty, and staff • Increase the breadth and depth of undergraduate and graduate student participation in research 	<ul style="list-style-type: none"> • 120-180 medical graduates annually by 2030 • 120 new faculty physicians and scientists by 2030 • Full accreditation by 2021 • New biomedical PhD programs that combine clinical experiences and research • Scholarship support for the majority of educational expenses for students • Genomic information and advanced technology education • Recruit and retain an excellent and diverse student body • Educational spaces that facilitate interdisciplinary teamwork • Teaching students through problem- and team-based learning • Graduate medical curriculum focused on: <ul style="list-style-type: none"> ○ Community and Public Health, Bioethics ○ Clinical Research ○ Business and Finance ○ Leadership and Community

B. Promote Student Learning and Success

o Mental Health and Addiction

Providing the technology environment. The UNLV IT Master Plan contains numerous action items designed to build a technology environment that:

- Provides a foundation for the university's diverse educational initiatives
- Supports the individual efforts of students, faculty, and staff as they pursue activities to promote student learning and success
- Provides the infrastructure for new medical education technologies
- Adapts to accommodate additional new initiatives that will arise out of both the Academic Master Plan and the Top Tier Plan

Table B-3 describes how action items within each IT Master Plan initiative provide specific support for promoting student learning and success. Detailed information about each of the action items, including outcomes and interdependencies, are described in the full initiative. A summary of the timeline and resources required for these action items can be found in Section 5.

**Table B-3: UNLV IT Master Plan
Promotes Student Learning and Success**

Initiative	Student Learning and Success Support
#1 Governance of IT	Includes representatives from Executive Vice President & Provost Office, Faculty Senate, and Student Affairs on the Technology Advisory Committee
	Includes committee members from four academic disciplines (Student Affairs, Faculty Senate, University Libraries, Graduate Professional Student Association, and Consolidated Students of UNLV) on the Technology Review Board
	Increases the impact of standing and ad hoc working groups of faculty and students addressing educational topics
#2 Strategic Technology Planning	Ensures the IT Master Plan aligns with evolving Top Tier educational goals, RPC efforts, and UNLV School of Medicine initiatives
	Fosters long-term planning to build an IT environment that supports rapid growth and innovation as articulated in the Academic Master Plan and college growth plans
	Adjusts IT priorities to address changing pedagogy and evolving student expectations
	Provides assessment of the Plan's effectiveness in meeting student and faculty needs
#3 IT Leadership and Coordination	Creates a CIO position that forms strong ties with student and faculty organizations
	Provides innovative technology leadership to meet evolving educational needs
	Charges the CIO with developing relationships with local, state, regional, and federal agencies to understand changes in technology that impact student success
	Fosters collaboration across the IT community to better support student success
	Provides a technology vision that champions faculty innovation, supports emerging

B. Promote Student Learning and Success	
	pedagogical techniques, and enables cross-disciplinary teaching
#4 IT Projects	Includes campus constituents representing educational needs in IT project prioritization
	Aligns IT procurement and project prioritization with advances in educational services
#5 IT Service Coordination	Coordinates IT services to provide greater uniformity for cross-disciplinary teams and faculty teaching in multiple departments
	Assesses campus IT services to identify technology changes necessary to improve student experiences and enhance teaching
	Establishes accountability for complex learning and student information IT services
	Identifies technology resources available to students and faculty
#6 Sustaining Technology Investments	Coordinates IT services to support discipline-specific technology needs
	Develops a funding model to maintain and renew technology that supports educational initiatives launched with grant or other one-time funds
	Updates IT infrastructure, enabling faculty to incorporate the latest technology in their academic work
#7 IT Awareness and Training	Improves the university's ability to implement new technology services that support student success initiatives and faculty innovation
	Expands just-in-time online and in-person technical training for instructional technologies
	Promotes peer-led professional development focusing on teaching and learning technology
	Facilitates user groups to connect faculty using similar technologies
	Increases use of on-line training resources to augment instruction and improve technical skillsets
	Restructures new faculty technology orientation programs
#8 Information Security	Creates both in-person and online technology orientations for new students
	Provides targeted information about IT security issues relevant to protecting student data
	Includes representatives from the Faculty Senate, Student Affairs, UNLV Libraries, and multiple colleges on the Cyber Security Team
	Implements backup services to ensure protection of educational documents and data
	Assists employees in mitigating risks associated with collecting, storing, and sharing student data
#9 iNtegrate 2	Facilitates compliance with IT security requirements that protect student information (e.g., FERPA, HIPAA, etc.)
	Improves the efficiency and transparency of academic administrative processes (e.g., hiring, procurement, travel, budgeting)

B. Promote Student Learning and Success

	Supports seamless integration between the new human resources and finance administration systems with the student information systems for better assessment of academic programs, budgets, and student success
#10 Identity Management and Single Sign-On	Expedites cross-institutional collaboration via federated credentials for authorization and access to shared educational resources through the InCommon Federation
	Simplifies access to educational resources and library collections at other institutions
	Expedites the provisioning of credentials for access to university applications and data
	Facilitates interdisciplinary collaboration through role-based security
#11 Mobility	Increases mobile access to major campus applications that support student success
	Provides infrastructure for faculty to develop and use mobile applications to augment courses
	Supports the innovative use of mobile devices in achieving learning and scholarly objectives
	Incentivizes innovative mobile application development by and for students and faculty
	Expands wireless capacity campus-wide
#12 Enterprise-wide Document Management	Increases ability to search for electronically-routed student and academic data and documents
	Provides automated records retention compliance for student and academic documents
	Implements a solution to route, approve, and retrieve academic documents (e.g., annual evaluation, conflict of interest, program review)
#13 Leveraging Institutional Data Management	Creates dashboards showing progress towards realizing Top Tier student achievement goals
	Facilitates data-driven reporting to enhance RPC and academic unit decision-making
#14 Communication and Collaboration Tools	Increased visibility of university programs across key audiences
	Increases teamwork, productivity, and administrative efficiency for students and faculty by maximizing the utilization of existing and new communication and collaboration tools
	Implements web-conferencing solutions to facilitate online office hours, group work, connecting with off-site guest lecturers, etc.
	Implements Customer Relationship Management tools for targeted student communication
	Implements student and employee portal landing pages with a single sign-on facilitating access to multiple campus applications
	Assists academic units in creating web pages that meet accreditation requirements

While each major initiative in the plan includes action items that will enhance the infrastructure and business practices that support teaching and learning, additional needs that did not fit squarely within

B. Promote Student Learning and Success

those initiatives have also been identified. Table B-4 provides a brief summary of additional actions items to meet the needs identified in the UNLV Current Information Technology Environment Report, the follow-up work sessions, and the leadership team review.

Table B-4: Additional Action Items that Promote Student Learning and Success

Type of Need	Recommended Action Item
Curriculum Support and Assessment	<ul style="list-style-type: none"> Provide training in the use of Google Sites as an e-portfolio solution to support course objectives and assist with assessment of degree offerings in schools and colleges
Teaching Evaluation	<ul style="list-style-type: none"> Implement tools to evaluate teaching effectiveness
Data Management and Analytics	<ul style="list-style-type: none"> Enhance RPC reporting and predictive modeling available from the Education Advisory Board Student Success Collaborative software Assist academic departments with department-specific database needs to help track RPC and growth metrics Develop additional analytics to support early warning activities and help track learning outcomes
Technology Support in Academic Departments	<ul style="list-style-type: none"> Create Academic Liaison positions in departments, schools, and colleges to provide discipline-specific technology support for faculty and students
Innovation in Teaching and Learning	<ul style="list-style-type: none"> Create a technology environment (i.e., IT Sandbox) facilitated by user groups for exploring new technological innovations in teaching and learning Create technology-enhanced collaborative learning spaces
Instructional Technology Support	<ul style="list-style-type: none"> Expand computer laboratory hours to 24/7 Install print station kiosks in key campus locations Provide a comprehensive video streaming solution for instructional technology video needs Enhance the campus learning management system Provide lecture capture services for faculty Transition to a new learning management system by 2019 Assist academic units in creating departmental web pages that meet accreditation requirements programs Create computing laboratory environments accessible from off campus to provide students access to software needed to complete course requirements
Academic Program Support	<ul style="list-style-type: none"> Develop internship opportunities in central IT to augment the curricular offerings in academic programs in IT disciplines

B. Promote Student Learning and Success

Educational Technologies in School of Medicine	<ul style="list-style-type: none"> • Select a Curriculum Management System (CMS) and Learning Management System (LMS) • Implement new WebAdMIT for Admissions • Assist with installation of virtual anatomy and virtual histology equipment • Coordinate IT components of facilities planning
Top Tier Student Achievement Metrics	<ul style="list-style-type: none"> • Assist with the implementation and/or integration of data from applications used to assess student achievement goals

C. Foster a Diverse Campus Population and Engagement with the Community

Provide technology services to foster a diverse campus population and community engagement.

UNLV's mission includes a commitment to address the challenges of urban growth, social justice, sustainability, and health care delivery, while furthering economic and cultural diversity. The university honors this commitment through the provision of research, educational, and outreach programs that improve the local and state communities it serves.

Fostering a diverse campus population. Part of being responsive to the needs of a diverse community prepared to thrive in a global economy is the creation of an educational environment that fosters inclusion, tolerance, and respect. This responsiveness is reflected in UNLV's educational mission through the learning outcomes that serve as the foundation for UNLV's new general education. Two of the learning outcomes are specifically designed to create graduates that:

- Have developed knowledge of global and multicultural societies, and an awareness of their place in and effect on them
- Are able to participate knowledgeably and actively in the public life of our communities and make informed, responsible, and ethical decisions in their personal and professional lives

Additional information about the many activities at UNLV to foster a diverse campus population can be found on the Office of Diversity Initiatives website at <http://www.unlv.edu/diversityinitiatives>.

UNLV's Top Tier Plan extends the university's commitment to diversity through activities that ensure the university maintains Minority Serving Institution (MSI) status and Hispanic Serving Institution (HSI) status. Table C-1 highlights action items designed to promote an inclusive environment that attracts and nurtures a diverse body of high-impact faculty members, excellent staff members, and promising students.

Table C-1: Meeting Top Tier Diversity Objectives

Action Items to Sustain MSI and HSI Status
<ul style="list-style-type: none"> • Identify and address barriers to hiring and retaining high-impact faculty members by providing competitive, market-driven compensation • Make UNLV more attractive by providing a welcoming, supportive environment for underrepresented faculty, students, and staff • Sustain a successful mentorship program targeted at assistant and associate professors as well as administrative faculty and classified staff as appropriate • Develop strong mentorship programs for graduate and undergraduate students • Hire, retain, and support high-impact research faculty members • Provide early-stage researchers seed grants to help launch research and publishing agendas that lead to early career awards

Furthermore, UNLV is committed to providing an inclusive environment for those who experience disabilities. The Disability Resource Center coordinates university efforts to promote individual growth and provide effective accommodations for students with disabilities.

Community engagement. In addition to its diversity initiatives, the Top Tier Plan is guided by a

C. Foster a Diverse Campus Population and Engagement with the Community

mission that affirms the university's commitment to enrich the cultural vitality of the many communities it serves. That mission is reflected in activities such as the annual Festival of Communities event. The event brings thousands of community members to the campus to celebrate the rich cultural diversity of UNLV and the Las Vegas Valley. The Festival is just one of over a hundred community programs and partnerships at UNLV designed to serve the community by improving access to social services, helping diversify the economy, providing cultural and civic events, and offering personal enrichment opportunities.

Through its partnership with The Lincy Institute, the university conducts and supports research focused on improving Nevada's health care, education, and social services. In addition, UNLV partners with the Brookings Institution through Brookings Mountain West to support research and provide policy recommendations that engineer sustainable, productive, and inclusive growth for the Intermountain West region. UNLV's Office of Economic Development facilitates additional private and public-sector partnerships designed to help diversify the economy through workforce development, industry-sponsored research, and the development and protection of intellectual property.

Additional information about the many existing community partnerships and programs can be found on UNLV's Community website at <http://www.unlv.edu/community>.

Top Tier community partnerships. UNLV aspires to be recognized as a top tier public university in community impact by 2025. Key milestones associated with the vision are shown in Table C-2.

Table C-2: Top Tier Community Impact Milestones

Community Partnership Milestones	Academic Health Center Milestones
<ul style="list-style-type: none"> • Build a Community Engagement Center • Provide a Community Dashboard to communicate UNLV successes to key constituents • Achieve Carnegie Community Engaged University Status • Increase the effectiveness of educational system partnerships, collaborations, and pipeline programs • Increase tech-transfer/commercialization activities • Increase patents, start-ups, and entrepreneurial ventures fostered by UNLV • Establish partnerships to enhance executive education, continuing education, and lifetime learning opportunities for the region • Success in UNLV's major athletic programs 	<ul style="list-style-type: none"> • \$800 million annual economic impact by 2025 • \$1.2 billion annual economic impact by 2030 • \$4 of non-state funds generated for every \$1 of state funds spent • \$350 million of philanthropic support secured by 2025 • 5,300 new jobs by 2025 • 8,000 new jobs by 2030 • Partner with Las Vegas hospitals and key physicians in the community to educate medical students, residents, and fellows • Recruit and educate medical school students who intend to remain in Nevada to practice and teach • Collaborate with existing Las Vegas institutions to establish the city as a world-class medical destination

Providing the technology environment. The IT Master Plan contains numerous action items designed to:

- Build a technology environment that provides a foundation for the university's diversity and community engagement initiatives

C. Foster a Diverse Campus Population and Engagement with the Community

- Support the individual and collective efforts of students, faculty, and staff as they engage in activities that strengthen community partnerships and diversify the economy
- Enable the Academic Health Center to implement state-of-the-art technologies to support its outreach efforts
- Be responsive to opportunities to extend the campus technology environment to help strengthen community partnerships
- Facilitate new initiatives to advance globalization, social and health services, sustainability, education, business development, and economic development

Table C-3 describes how action items within each IT Master Plan initiative provide specific support to foster a diverse campus population and engagement with the community. Detailed information about each of the action items, outcomes, and interdependencies can be obtained by reading the full initiative. A summary of the timeline and resources required for these action items can be found in Section 5.

**Table C-3: UNLV Master Plan
Fosters a Diverse Campus Population and Engagement with the Community**

Initiative	Diversity and Community Engagement Support
#1 Governance of IT	Includes an Advancement representative on the Technology Advisory Committee
	Includes an Academic Health Center representative on the Technology Review Board
	Establishes technology standards that improve the university's ability to partner with local service providers
	Provides opportunities for community partners to help shape UNLV's technology vision
#2 Strategic Technology Planning	Regularly aligns the IT Master Plan with Top Tier community partnership goals
	Includes alumni and community partners in the annual assessment of the Plan
	Provides assessment of the Plan's effectiveness in fostering a diverse campus population and in supporting community partnerships
#3 IT Leadership and Coordination	Provides a CIO to foster opportunities for IT collaboration, contribution, and community partnerships with key regional constituencies
	Champions a shared vision among southern Nevada educational partners to help students master technologies needed to succeed in higher education and the global workforce
	Charges the CIO with exploring technology collaborations among local, state, regional, and federal entities, and the university to mutual benefit
	Provides innovate technology leadership to help address the growing need for highly qualified information technology specialists in Las Vegas and across the state

C. Foster a Diverse Campus Population and Engagement with the Community

#4 IT Projects	Encourages leveraging community partnerships, collaboratives, and outsourcing to deliver new technology initiatives
	Aligns IT procurement and project prioritization with community partnership goals
	Facilitates the university's ability to utilize and sustain technology donations
#5 IT Service Coordination	Catalogs all IT Services to identify technology resources available to university-affiliated centers and community partners
	Includes community partnership needs when evaluating IT service provision
	Increases local and regional collaborations to expand technology infrastructure services
#6 Sustaining Technology Investments	Develops a funding model to maintain and renew technology acquired through grants or community partnerships
	Improves the university's ability to rapidly implement new technology services that support community initiatives and innovation
#7 IT Awareness and Training	Collaborates with local and state leaders for cost-effective technical training to meet the needs of UNLV technical staff and IT workforce development
	Leverages the InNEVation Center resources to enhance cross-training and innovative development for technologists from the university, businesses, and the community
#8 Information Security	Provides IT security consultation for grants and contracts providing community services
	Ensures appropriate IT security for conferences and public events held in UNLV venues
	Assists university-affiliated programs with establishing IT security measures that protect sensitive information and meet compliance standards
#9 iNtegrate 2	Minimizes manual administrative processes for vendors providing services to the university
	Provides comprehensive data for reporting on issues of interest to community partners
#10 Identity Management and Single Sign-On	Facilitates collaboration with university-affiliated groups through role-based security
	Expedites the provisioning of university credentials for affiliate faculty and staff
	Increases access to medical resources and library collections at other institutions, strengthening the expertise university-affiliated programs can offer the community

C. Foster a Diverse Campus Population and Engagement with the Community

#11 Mobility	Improves wireless services at conferences and public events held in UNLV venues
	Incentivizes innovative mobile application development to help meet community needs
	Engages civic-minded innovators in mobile application development by increasing open-data initiatives and challenge competitions
#12 Enterprise-wide Document Management	Assists with e-forms creation, electronic data capture, and automated workflows to increase administration efficiency of university-affiliated programs
	Provides automated records retention compliance for university documents
	Provides university-affiliated centers and community partners with tools to electronically route data and documents
#13 Leveraging Institutional Data Management	Creates dashboards showing progress towards Top Tier community partnership goals
	Provides data analytics and reporting tools to better assess UNLV diversity
	Enhances access to university data and reports to support workforce development initiatives
#14 Communication and Collaboration Tools	Increases visibility into the many UNLV initiatives designed to meet community needs
	Improves the ease of use of UNLV's website for both on and off campus constituents
	Implements web-conferencing tools to facilitate mentorship
	Maximizes the utilization of existing and new collaboration tools to enhance campus culture
	Implements Customer Relations Management tools for targeted communications with community groups

While each major initiative in the plan includes action items that will enhance the infrastructure and business practices that foster a diverse campus population and engagement with the community, additional needs that did not fit squarely within those initiatives have also been identified. Table C-4 provides a brief summary of additional action items to meet the needs identified in the UNLV Current Information Technology Environment Report, the follow-up work sessions, and the leadership team review.

Table C-4: Additional Action Items that Foster a Diverse Campus Population and Engagement with the Community

Type of Need	Recommended Action Item
Educational Outreach	<ul style="list-style-type: none"> Provide learning management system necessary to expand community outreach through in-person and online continuing education offerings
Economic Diversification	<ul style="list-style-type: none"> Expand the UNLV IT community's involvement the InNEVation Center's mission to diversify the Nevada economy through innovation

C. Foster a Diverse Campus Population and Engagement with the Community

IT Workforce Development	<ul style="list-style-type: none"> Assist in developing, attracting, and retaining IT professionals needed to serve local, state, and regional businesses, and governmental agencies as well as the growing technology sector in Las Vegas
Alumni Outreach	<ul style="list-style-type: none"> Help provide lifelong connections for university alumni through the implementation of appropriate technologies Create a new alumni chapter for members with a shared interest in technology
Assessment	<ul style="list-style-type: none"> Provide assistance with the implementation and support of tools to track and evaluate fostering inclusion, community engagement, and community partnership initiatives
Assistive Technologies	<ul style="list-style-type: none"> Increase the availability of technologies that promote accessibility and success for students with disabilities

SECTION 1 – GOVERNANCE AND PLANNING

IT Master Plan initiatives in Section 1 focus on building a strong governance structure led by a new Chief Information Officer with the vision to unite the technology community, oversee strategic technology planning, and prioritize resources, thereby transforming IT from a foundational service to a key strategic asset.

1. Governance of IT	Establish a governance structure for information technology that is informed by representative groups of campus stakeholders. The structure should facilitate decisions and establish priorities that support UNLV's strategic directions and provide an evolving technology vision that maintains alignment with those directions.
2. Strategic Technology Planning	Create a sustainable strategic technology planning process that engages the campus community, adapts to evolving institutional priorities, communicates key planning milestones, and aligns with other campus planning cycles.
3. IT Leadership and Coordination	Establish a Chief Information Officer (CIO) position at UNLV that provides a technology vision, aligns IT efforts with strategic initiatives, leads IT service delivery, and facilitates IT planning efforts across the university's community of central and distributed IT personnel.
4. IT Projects	Establish IT project review and purchasing approval processes that maximize UNLV's IT investments. These new processes will facilitate the deployment of new services, improve IT service coordination, and provide transparent decision-making.

1. Governance of IT

Establish a governance structure for information technology that is informed by representative groups of campus stakeholders. The structure should facilitate decisions and establish priorities that support UNLV's strategic directions and provide an evolving technology vision that maintains alignment with those directions.

A strong technology governance structure is essential for creating an information technology environment able to support a Top Tier institution. UNLV's need to develop such a structure was a recurring recommendation in almost every IT planning session (e.g., Current IT Environment Report, planning work sessions, conversations with the Strategic Technology Planning Core Team, discussions with campus leadership).

The technology governance structure proposed for UNLV includes a Chief Information Officer (CIO) supported by two new governance groups – the Technology Advisory Committee (TAC) and the Technology Review Board (TRB). The structure is designed to enable the university to assess technology needs, establish priorities, and execute plans in a coordinated and collaborative manner. The expected outcome is more effective delivery of IT services across the UNLV community.

In the near term, the work of the governance structure includes ensuring that the campus technology vision and associated priorities are aligned with and support UNLV's Top Tier Plan, Academic Master Plan, College Growth Plans, and related Retention, Progression and Completion efforts.

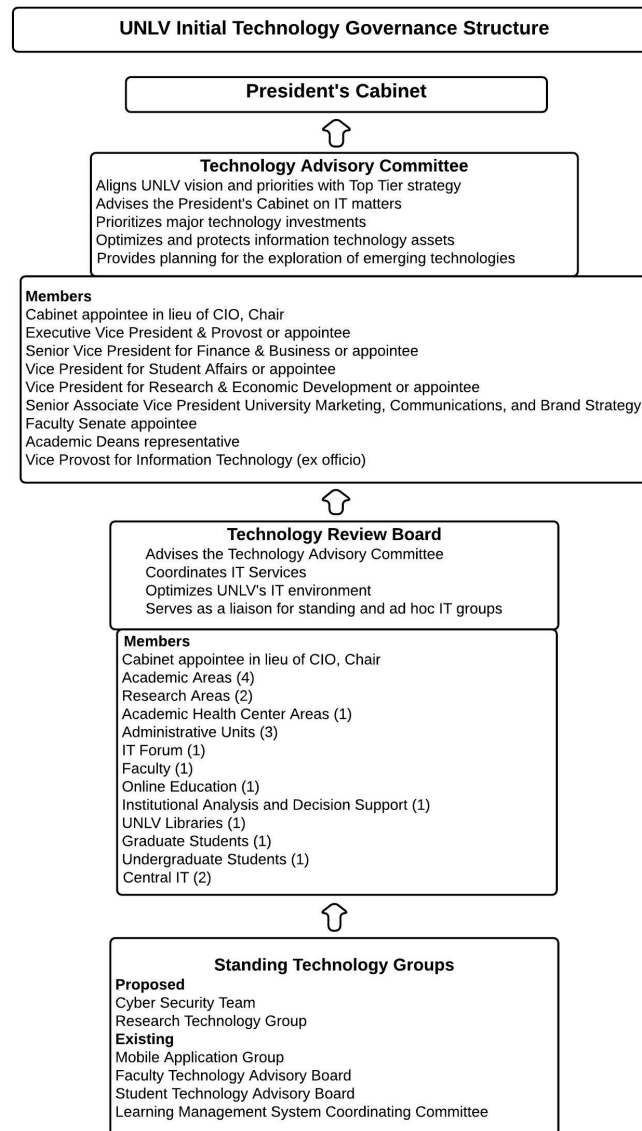
Criteria for effective technology governance. The governance structure is intended to be collaborative, efficient, adaptive, accountable, innovative, inclusive, and transparent to faculty, staff, and students. The following criteria were used to define that structure:

- Focused on supporting the university mission and overall strategic plans
- Guided by the UNLV Technology Vision and Values
- Facilitates informed and timely decision-making
- Limits bureaucracy
- Fosters stakeholder engagement
- Depends on cross-functional participation
- Provides a nimble framework that allows for ad hoc working groups when needed
- Remains transparent to the entire university community via consistent communications
- Receives substantial buy-in and support from the university community
- Sponsored by university leadership

The ongoing effectiveness of the structure should be assessed annually using the above criteria. Furthermore, maintaining strategically-determined group membership and continued flexibility will help sustain governance authority and credibility.

Governance structure. The technology governance structure includes a new CIO who is a member of the President's Cabinet (see Initiative 3). The CIO facilitates the work of two complementary groups that serve distinct roles in supporting technology governance – the Technology Advisory Committee and the Technology Review Board. The following exhibit describes the structure and membership of the two technology governance groups.

1. Governance of IT



Together the governing bodies are responsible for decision-making, priority approval, and direction setting for UNLV's IT investment. Their combined efforts are designed to create a cooperative and unified IT foundation to enable the university to meet its research, student achievement, and community partnership goals.

Technology Advisory Committee (TAC). Committee representatives are expected to bring institutional-wide perspectives on academic, student-related, research, operational, and administrative priorities as well as knowledge about priorities in their divisions. The primary responsibilities of the group are to:

- Establish a technology vision and set priorities that align with university strategic goals
- Advise the President's Cabinet on matters related to technology projects, budgeting, and planning
- Prioritize and approve major technology investments

1. Governance of IT

- Optimize and secure information technology assets

TAC membership is intentionally small and closely tied to the Cabinet to help maintain a high-level unified vision and keep prioritization closely aligned with university strategy. The TAC provides the IT vision used by the Technology Review Board (TRB) to guide its decision-making. It also provides oversight, approval, authorization, and guides organizational change to support the implementation of TRB decisions. The full membership and a list of charges for the TAC are included in Appendix 1A.

Technology Review Board (TRB). The board is comprised of technology specialists from across campus. The primary responsibilities of the group are to:

- Create and maintain a secure, adaptable, cohesive campus-wide core technical environment that can quickly take advantage of current and future opportunities
- Serve as the technical advisory group for the Technology Advisory Committee
- Serve as a liaison for standing and ad hoc campus and NSHE technology groups
- Provide coordinated IT services designed to support both campus strategic directions and individual needs

The TRB reports to the Chief Information Officer who serves as chair and facilitates the work of the group. The full membership and a list of charges for the TRB are included in Appendix 1A.

The established technology governance structure is also supported by standing campus technology groups (e.g., Cyber Security Team proposed in Initiative 8) as well as ad hoc working groups created to address specific technology governance and planning needs of the university. The standing and ad hoc groups provide subject matter expertise and assist with TAC and TRB committee charges.

Transparency. The new technology governance structure establishes broad campus representation on two governance committees to ensure a university perspective when technology matters affecting the campus are considered.

The TAC is charged with ensuring that technology governance is transparent, particularly with regard to priority setting and decision-making. Specific action items include:

- Regularly updating the campus community on IT priorities and progress on initiatives
- Developing mechanisms for participating in planning activities, requesting projects and/or new services, providing feedback, assessing progress, etc.
- Ensuring information about technology services and support is readily available and understandable
- Creating communication channels tailored to meet the needs of audiences varying in technical knowledge

The TRB also has specific charges associated with transparency including:

- Regularly reviewing and updating the campus IT Service Catalog (see Initiative 5)
- Providing forums for discussion and resolution of IT service issues

Additionally, the Chief Information Officer provides a single point of contact for other technology issues that fall outside the formal governance structure.

While the CIO position is integral to the strength and cohesiveness of the governance structure, the two governing bodies can make considerable progress prior to hiring a CIO. It is recommended that the President's Cabinet appoint an interim representative to convene and facilitate the technology governance groups until such time as a CIO is hired.

1. Governance of IT	
Initiative Owner	President
Consultative Role	President's Cabinet
Budget Estimate	
<p>The initiative will require a fundamental change in technology planning, strong participation from the UNLV IT community, a change in culture, and the committed involvement of executive leadership. No direct costs are associated with this initiative, but implementation is dependent on hiring a CIO and establishing an associated office. Costs for the CIO office are included in Initiative 3.</p> <p>New Positions: 0 FTE; Total One-time and Recurring Costs FY16-FY19: \$0</p>	
Action Items to Implement Initiative	
<ol style="list-style-type: none"> 1. Adopt the recommended technology governance structure. 2. Communicate the governance structure to the university. 3. Appoint an interim representative to convene and facilitate the Technology Advisory Committee (TAC). 4. Establish the Technology Advisory Committee (TAC). 5. Establish the Technology Review Board (TRB). 6. Establish the newly proposed standing groups (Cyber Security Team, Research Technology Group). 7. Review standing groups and create ad hoc working groups as needed. 8. Assist the campus in adjusting to the cultural changes associated with adopting a new technology governance structure. 9. Create annual goals and a planning calendar for achieving TAC and TRB action items. 10. Create and implement a communication plan to ensure transparency goals are met. 11. Annually assess the effectiveness of governance structures and take corrective actions as needed. 	
Anticipated Benefits	
<ul style="list-style-type: none"> • Comprehensive IT planning and management improve technology services. • Improved effectiveness, visibility, and transparency of technology decisions, priorities, and planning. • Increased stakeholder understanding of decisions related to selection, acquisition, development, and implementation of major information systems. • Reduction in costs and complexity through coordinated services and integrated processes. • Increased communication and collaboration within the technology community. • Alignment between technology investments and university strategic initiatives. 	
Measures of Success	
<input checked="" type="checkbox"/> IT governance structure established.	

1. Governance of IT

- ✓ Annual roadmap for implementing Plan action items provided.
- ✓ Annual progress report on key performance indicators published.
- ✓ Increased participation by campus stakeholders in IT decision-making.
- ✓ Better awareness of IT decision-making processes on campus.
- ✓ Increased satisfaction with IT decision-making processes on campus.
- ✓ Improved customer satisfaction with technology services.
- ✓ Annual review of TRB's activities demonstrates success in meeting responsibilities.
- ✓ TAC's annual review meets criteria for effective technology governance.

Contextual Information

Peer Institution Research. Variations of the proposed technology governance model have been used successfully in multiple higher education environments. For example, George Mason University's (GMU) governance structure has been in place for eight years. Its model is composed of four main committees (similar to the proposed TRB with standing and ad hoc working groups) that support an Executive Council (similar to the proposed TAC). The other committees work to represent all major voices of the university including the Academic Institution Advisory Committee, Faculty Senate Technology Policy Committee, Portfolio Evaluation/Governance Group, and Architectural Standards.

Other Relevant Research. Technology governance structures describe who makes which decisions, who provides input and analyzes issues, who sets priorities, and who settles disputes when there is no clear consensus. Good governance processes are actively designed, are well understood by participants, and foster timely decisions that are communicated effectively. When effective, the technology governance structure should yield decisions that are aligned with and help achieve institutional strategic goals. Technology governance is focused on the entire technology function across the university and is not intended to replace day-to-day operations.

Source: ECAR Key Findings "Process and Politics: IT Governance in Higher Education" by Ronald Yanosky and Judith Borreson Caruso, July 2008. <http://net.educause.edu/ir/library/pdf/ekf/EKF0805.pdf>

2. Strategic Technology Planning

Create a sustainable strategic technology planning process that engages the campus community, adapts to evolving institutional priorities, communicates key planning milestones, and aligns with other campus planning cycles.

The IT Master Plan is designed to guide the university in making strategic technology decisions that set priorities, improve service delivery, and leverage investments to build an IT foundation capable of supporting UNLV's Top Tier aspirations. As the Plan is being implemented, technology will advance, UNLV's current strategic initiatives will continue to be refined, and new strategic directions will emerge.

Infusing ongoing strategic technology planning into the UNLV culture will ensure that the IT environment adapts to changing needs and anticipates new directions. Building that culture depends on the following:

- Strong, ongoing plan sponsorship from senior leadership
- Clear communication to stakeholders as initiatives are implemented
- Faculty, administrators, and staff promoting changes that are in the best interest of the university
- Willingness to redirect existing technology resources
- Ability to secure additional resources in response to changing business needs
- Achieving a balance between addressing immediate challenges and building the foundations necessary to achieve longer-range strategic goals
- A strong IT governance structure

The Chief Information Officer and the Technology Advisory Committee have specifically been charged with overseeing a strategic planning process that ensures:

- Campus involvement
- Alignment with campus strategic directions
- Annual goals are established
- Securing resources to meet plan initiatives
- Annual assessment of progress on plan goals and initiatives
- The Plan remains relevant through annual updates

Alignment. The strategic directions of the university are rapidly evolving to support Top Tier.

Additionally, the requirements associated with maintaining regional accreditation, campus activities in support of UNLV's Core Themes, and initiatives for maintaining Hispanic Serving and Minority Serving institutional status will need to be periodically reviewed to maintain alignment of the technology plan with campus strategic directions. Specifically, the Plan must evolve accordingly by:

- Setting priorities that align with and help meet university strategic directions (e.g., Top Tier and Retention, Progression and Completion (RPC) initiatives)
- Ensuring decisions regarding technology investments and services support the strategic directions
- Providing periodic updates to the IT Master Plan that align with evolving system-wide and campus plans (e.g., Workday Plan, Campus Master Plan, Academic Strategic Plan, Research

2. Strategic Technology Planning

Master Plan, Academic Health Center planning)

- Being responsive to constituent expectations for individualized uses of shared technologies

Campus involvement. Sustaining the Plan will require a collaborative process that targets outcomes supported by the entire campus community. Ensuring the Plan continues to meet campus needs requires including the right blend of individuals in the governance process and engaging campus constituents to determine new needs and changing requirements. Many changes will be non-technical and may entail cultural shifts, process redesign, policy adjustments, and/or budgetary modifications. Gaining and maintaining the support of the campus will require clear, consistent, and regular communication.

Two new groups designed to increase stakeholder participation in the governance process, the Research Technology Team (see Initiative 1) and the Cyber Security Team (see Initiative 8), will provide additional expertise and breadth to the planning process. In addition to more inclusive governance, the planning process will provide the campus community with opportunities to voice opinions, ask questions, and share insights into technologies impacting pedagogy and research within their respective disciplines.

Annual goals. Continuous attention to the alignment of the IT Master Plan with university strategic directions coupled with ongoing feedback from campus constituents sets the stage for updating the Plan and re-evaluating priorities. Those priorities must be translated into achievable annual goals with recommendations for securing appropriate resources. The annual goals and objectives should be widely shared and progress towards completion of each should be proactively monitored and communicated.

These annual planning activities provide a predictable roadmap that allows campus constituents to partner with IT to transform the IT environment from a foundational service to a key strategic asset.

Strategic planning for a CIO. Many of the initiatives in the Plan are dependent on hiring a Chief Information Officer. Initiative 1 empowers the Technology Advisory Committee, under an interim leader, to oversee strategic implementation of the Plan until a CIO is on-board.

Initiative Owner	Chief Information Officer and Technology Advisory Committee
Consultative Role	Technology Review Board and Standing Campus Technology Groups

Budget Estimate

No direct costs are associated with this initiative, but implementation will require time from internal resources and the active participation of students, faculty, and staff.

New Positions: 0 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$0

Action Items to Implement Initiative

1. Communicate the Plan to the university community.
2. Institute an ongoing planning cycle.
3. Ensure technology planning continues to align with the strategic directions of the university.
4. Develop mechanisms for collecting, assessing, and addressing campus feedback.

2. Strategic Technology Planning	
5.	Establish priorities and create milestones for completing initiatives.
6.	Optimize the IT Master Plan roadmap to align with the CIO hiring process.
7.	Provide an annual progress report.
Anticipated Benefits	
<ul style="list-style-type: none"> • More predictable technology roadmaps. • Increased engagement from the campus community in setting technology priorities. • More strategic technology spending. • Technology changes become increasingly proactive. • IT planning is sufficiently agile to support strategic opportunities. 	
Measures of Success	
<ul style="list-style-type: none"> ☑ Academic and administrative stakeholders are included in IT planning. ☑ The IT Master Plan is referenced in university strategic planning and decision-making. ☑ Annual milestones on the established planning cycle have been met. ☑ Plan updates are based on constituent input and are shared widely. ☑ Annual reviews of the Plan demonstrate significant progress on initiatives. ☑ Technology spending and decisions align with the Plan. ☑ Annual reviews of the Plan reflect alignment with university strategy. 	
Contextual Information	
<p>Peer Institution Research. Both Arizona State University (ASU) and George Mason University (GMU) have created IT strategic plans. While the plan at ASU is more reactive than proactive, the plan was developed to tie the technology vision to the strategic plan of the university.</p> <p>The University of Oregon (UO) has established a Campus Technology Council whose scope includes defining a strategic vision and plan for technology services that is aligned with the strategic direction and mission of the university. The Council has purview over instructional, research and administrative strategic technology planning, architecting the technology infrastructure, and finding an appropriate balance between central and distributed technology resources.</p>	

3. IT Leadership and Coordination

Establish a Chief Information Officer (CIO) position at UNLV that provides a technology vision, aligns IT efforts with strategic initiatives, leads IT service delivery, and facilitates IT planning efforts across the university's community of central and distributed IT personnel.

Currently, UNLV does not have an IT role with the authority to lead the entire IT community. This has impacted the ability of executive leadership to understand the full scope of IT services and resource capacity at UNLV. The creation of a Chief Information Officer (CIO) at UNLV is highly recommended.

The IT community at UNLV consists of both central and distributed IT personnel. In the current environment assessment, BerryDunn reported 197 FTEs who provide IT services at UNLV (see Appendix A). The Office of Information Technology (OIT) represented less than 40% of the total IT personnel population, leaving a significant portion of IT personnel fragmented and siloed. The distributed nature of IT at UNLV poses challenges for effectively coordinating IT resources. The result is a campus of constituents with disparate IT service delivery experiences.

The Chief Information Officer (CIO) will be responsible for executive leadership and strategic vision concerning all university information technology assets, infrastructures, and services. To start, the Office of the CIO should be comprised of the following functions to develop strategy and align planning efforts:

- IT security
- IT project management
- IT communications
- IT business services (e.g., budget, human resources)

Each of these functions is best directed at the broadest possible level to ensure consistency of IT services, policies, and best practices. The head of central IT will report to the CIO to ensure central IT infrastructure and operations are in alignment with the vision of the CIO.

A university-wide CIO must also have the leverage to create efficiencies by identifying opportunities to optimize services provided today across the central and distributed IT portfolio (see Initiative 5 for an introduction to the concept of Common Good services). A new CIO will need to determine the right mix of central and distributed IT services with input and guidance from university stakeholders.

Furthermore, the new CIO needs to be empowered to restructure existing IT resources, both central and distributed, to meet Top Tier goals. Additionally, the creation of the CIO position is a critical step in coordinating and effectively implementing the initiatives identified in the IT Master Plan and in ensuring that IT master planning continues to align with Top Tier plan goals and objectives.

Strategic initiatives underway. Far-reaching initiatives are underway at UNLV including, but not limited to, Top Tier and Retention, Progression and Completion (RPC). IT needs to be represented at the highest leadership levels to inform other cabinet-level executives about how technology can support these efforts. IT initiatives need greater visibility to reduce the risk of authorizing technology procurements and projects that do not align with the university's strategic direction. In addition, several large, complex IT initiatives are underway that will have significant impact on the university's ability to deliver, support, and maintain IT services going forward. These efforts include, but are not limited to:

- Workday implementation (i.e., replacement of human resources and business systems)
- Replacing aging infrastructure

3. IT Leadership and Coordination

- Enterprise-wide document management
- Identity and access management

Serving the community beyond the campus. As the university strives to increase its research capacity and support economic development efforts across the larger Las Vegas area, a cabinet-level CIO can help broaden critical community partnerships. For example, Switch, an international leader in data center management and broadband connectivity, could be a key resource in addressing some of the infrastructure needs that exist at UNLV today. A CIO could foster the relationship with Switch in innovative and mutually beneficial ways. In addition, a CIO could assist in strengthening the partnership between UNLV and the Las Vegas business community via IT initiatives that focus on workforce development in the technology field and innovation hubs as the region continues to diversify its economy.

Initiative Owner	President's Cabinet
Consultative Role	Technology Advisory Committee and Human Resources

Budget Estimate

According to the 2013 Chief Information Officer Roles and Effectiveness Study (CHECS) the average CIO salary at Doctoral Institutions was \$173,522. In addition, according to 2011-2012 data collected by the Chronicle for Higher Education, the median salary for CIO's at Doctoral Institutions was \$200,000 (see <http://chronicle.com/article/Median-Salaries-of-Senior/130897/>). See Appendix 3A for a list of CIO responsibilities.

The Office of the CIO will be staffed with existing positions currently housed in central IT.

New Positions: 1 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$751,413

Action Items to Implement Initiative

1. Secure funding and approval for the CIO position.
2. Determine the reporting structure for the CIO position.
3. Include key elements of the IT Master Plan in the CIO job description.
4. Identify and hire a CIO through a comprehensive search process with broad campus participation.
5. CIO establishes a strategic vision for distributed and central IT.
6. Optimize services across central and distributed IT
7. Task the CIO with implementing the IT Master Plan and give the CIO authority to do so.
8. Assist the CIO in developing mutually beneficial partnerships with key members of the Las Vegas community.

Anticipated Benefits

- UNLV is guided by a strong IT leader.
- UNLV's IT vision drives technology innovations that foster Top Tier growth.
- Strategic alignment of IT with university goals and objectives.

3. IT Leadership and Coordination

- Technology changes transforming higher education inform executive-decision making.
- Optimization of distributed and central information technology assets, infrastructures, and services.
- Technology service delivery is seamless.
- UNLV recruits, motivates, and develops a high-performing team of well-qualified IT staff.

Measures of Success

- ☒ New CIO is hired.
- ☒ Distributed and central information technology assets, infrastructures, and services align with the CIO's vision
- ☒ Performance reviews of the new CIO are deemed satisfactory or better.
- ☒ Cabinet-level decisions include a consideration of technology impacts, where appropriate.
- ☒ Components of the IT Master Plan are being implemented.
- ☒ Customers and stakeholders report more effective IT service delivery and proactive IT planning.
- ☒ New community partnerships initiated by the CIO have been established.

Contextual Information

EDUCAUSE Core Data. Data from U.S. public institutions that meet the Very High Research University Carnegie classification indicate that:

1. The highest-ranking IT officer has the title of CIO at over 80% of these institutions
2. The highest ranking IT officers at over 80% of the institutions report to either the President, the Chief Academic Officer, or the Chief Financial Officer
3. The highest ranking IT officer serves as a member of the President's Cabinet at nearly half of these institutions

The EDUCAUSE data also indicated that, although CIO's can be effective with different reporting lines, CIO's that report to the top academic officer allocated more capital spending to grow the institution while CIO's reporting to the top business officer allocated a smaller proportion of funding and focused more on the operations of running the institution.

<https://net.educause.edu/ir/library/pdf/PUB8010.pdf>

EDUCAUSE produces an annual list of top ten issues for higher education IT to consider. Although all of these issues are relevant to the future CIO's role and to UNLV's IT Master Plan, Issue 9:

IT Organizational Development: Creating IT organizational structures, staff roles, and staff development strategies that are flexible enough to support innovation and accommodate ongoing changes in higher education, IT service delivery, technology, and analytics.

will be a key consideration for the CIO to address at UNLV upon arrival as the university works to build a more cohesive IT community. For the complete EDUCAUSE 2016 Top 10 IT Issues list, see the Introduction and Overview Section.

3. IT Leadership and Coordination

Peer Institution Research. At Arizona State University (ASU), George Mason University (GMU), and University of Oregon (UO), the CIO sits on the President's cabinet. These universities indicated that the reporting structure provided an effective way to keep the executive management team informed on decisions affecting technology on campus.

ASU, GMU, and UO indicated that one of their primary concerns is to find the appropriate balance between distributed and centralized IT. Distributed IT is a major contributor to IT at these universities, especially in terms of staffing numbers and technology spending.

GMU: Highly centralized IT department with an approximate ratio of 3:1 for central IT to distributed IT personnel.

UO: Approximate ratio of 1:5 for central IT to distributed IT personnel. Where appropriate, the CIO at UO is beginning to absorb distributed members that are spread across campus.

However, each university expressed the need to have both central and distributed IT resources in order to best serve the campus community.

4. IT Projects

Establish IT project review and purchasing approval processes that maximize UNLV's IT investments. These new processes will facilitate the deployment of new services, improve IT service coordination, and provide transparent decision-making.

A strong IT governance structure informed by continuous IT strategic planning that includes periodic reviews, broad stakeholder involvement, and keen attention to the strategic direction of the university will provide a solid foundation for ensuring the technology environment meets campus needs. This foundation, coupled with the strong vision and leadership of the Chief Information Officer, will help UNLV transform IT from a foundational service to a key strategic asset.

One of the critical components of this transformation is determining how decisions will be made regarding the approval and prioritization of IT projects. A strong IT project review process will:

- Ensure UNLV's limited IT resources are deployed on the most critical campus initiatives
- Account for the resources needed to keep technologies operational, up-to-date, and secure
- Address the needs of both large, high-impact, campus-wide projects and smaller projects that enable individual units to achieve their organizational objectives

An effective IT project review process requires a complementary IT purchasing approval process with components such as: technical reviews for IT purchases that meet established cost thresholds and ensure compliance with other campus technologies; adherence to newly developed standards to maximize pricing discounts during vendor negotiations; and strong links to the IT project process to reduce the unnecessary duplication of services and the inefficient use of resources.

In very practical and transparent ways, the decisions made through the IT project review process and purchasing approval processes will reflect UNLV's progress on the transformation of its IT environment.

Current environment. The overwhelming number of technology requests, combined with the lack of a defined process for prioritization, has contributed to unclear expectations and unacceptable timelines for project implementation. Delays in project completion have created frustration among campus stakeholders, sometimes leading to the implementation of short-term solutions that solve immediate needs but create longer-term issues (e.g., multiple colleges adopt various software solutions for automating teaching evaluations, students must learn how to use different solutions, multiple interfaces must be created for the software to be accessed through the learning management system, evaluations cannot be compared across colleges). As noted in the Current Information Technology Environment Report, units deploy local solutions without adequate knowledge, expertise, or resources and then rely on others to complete the implementation of their respective solutions. Additionally, technology purchases are made without enough knowledge of interoperability requirements, without awareness of the lack of unit resources for effective implementation, and without sufficient attention to security concerns.

The effort and resourcefulness UNLV staff demonstrate when attempting to fulfill university needs created under these circumstances is laudable and there is considerable collaboration after the fact to make the technology investments work. However, the ad hoc nature of these activities forces the campus to operate in a reactive mode of service delivery that challenges the university's ability to address broader strategic objectives proactively. Notwithstanding its challenges, the current environment provides a great deal of flexibility. The new processes must take into account the need to

4. IT Projects

address new and rapidly changing needs and be agile enough to meet those needs in a timely fashion.

Addressing the challenges. Designing the new processes will require a significant initial effort. Several challenges will need to be addressed as the processes are being developed.

Current Challenges	Recommendations
UNLV has significantly more technology project requests than resources to fulfill them and no formal processes for prioritization.	<ul style="list-style-type: none"> Utilize a tiered-system of IT project review authorizing IT governance groups to prioritize projects consistent with the group's organizational level and expertise. Provide tools to help IT governance groups balance campus needs, available resources, project interdependencies, and to manage new processes for resource requests and/or reallocation of existing resources. Use efficiencies gained through coordination of projects, expansion of existing services, and economies of scale to resource additional projects.
The campus does not have a complete list of current IT services, making it difficult to determine if a new project will introduce redundant services or enhance existing services.	<ul style="list-style-type: none"> As part of the IT project review process, consult the IT Service Catalog (see Initiative 5) to determine if existing services will meet the need. Utilize the Technology Review Board's (TRB) broad knowledge of campus IT and emerging campus technical standards to inform the IT project review process.
There is no single source of information about the IT projects currently being implemented, making it difficult to know whether newly approved projects will be complementary or redundant.	<ul style="list-style-type: none"> Implement a Project Portfolio Management system that provides updated schedules, resource requirements, and documentation of all IT projects. Leverage improved collaborations among the UNLV IT community for additional information on existing projects.
Major technology purchases are subject to substantial purchasing review. Technical reviews to ensure compatibility with campus technical and security standards and integration with other campus technologies are not always included.	<ul style="list-style-type: none"> Update UNLV procurement procedures to include a technical review when purchases exceed established thresholds. Utilize emerging campus IT standards to establish contracts that facilitate expedited cost-effective purchases of standard equipment. Ensure new steps in the procurement procedures are completed in as timely a manner as possible.
Top Tier, RPC, and community engagement initiatives include a large number of new projects (see Initiatives A, B, and C) that will depend on the implementation of new technologies and integration with existing campus systems.	<ul style="list-style-type: none"> Submit all new projects through the IT project review process to ensure the resources are available for successful implementation, required integrations, new services requirements, and ongoing support.

4. IT Projects

<p>The Workday project (see Initiative 9) will require assistance from existing technical staff and will produce a significant number of new technical projects.</p>	<ul style="list-style-type: none"> • NSHE mandated projects should be included in the UNLV IT Project Portfolio, allowing priorities and timelines for other UNLV IT projects to be adjusted accordingly.
<p>The IT project review process must balance large, high-impact, institution-wide projects with small projects that meet pressing local needs.</p>	<ul style="list-style-type: none"> • Create multiple portfolios to manage projects of varying sizes and scope. • Review all the portfolios for information to help maintain the desired balance between large and small projects.

Creating an effective process. Individual project decisions must move into a broader framework of university-wide technology governance (see Initiative 1). Doing so will allow UNLV to review, prioritize, and approve technology projects and major purchases in the context of changing campus priorities, resource availability, existing technology standards (see Initiative 6), evolving security requirements (see Initiative 8), and documented IT service needs (see Initiative 5).

An effective IT project review process at UNLV should:

- Maximize IT investments by selecting and prioritizing the optimal combination of projects to meet the university's strategic goals
- Ensure that the degree of review, approval, and monitoring is consistent with the scope of the project
- Provide a high-level view of the status of all campus IT projects (e.g., requested, pending, approved, completed) to inform university planning, collaboration, and decision-making
- Balance the needs for new services, service enhancements, innovation, security, and a robust infrastructure
- Build interoperability, security, data management, and usability into the IT project review process
- Coordinate the IT project review process with the IT purchasing approval process
- Make optimal use of outsourcing, economies of scale, and existing resources
- Address both campus-wide and unit-specific IT project and IT purchasing needs
- Utilize transparent and easy-to-follow processes for requesting approval and tracking projects
- Support expeditious service delivery

IT project intake and tracking. A project portfolio management (PPM) tool is essential to provide a transparent IT project request process and expeditiously manage the flow of information needed in the decision-making process. Project portfolio management tools provide the structure to manage project delivery from initiation to completion and to effectively estimate the availability of project resources. Without a PPM system to manage project intake, delivery, and resource availability, organizations typically overcommit, approving more projects than can be completed in a given time frame. A PPM system also provides transparency into the full range of projects in the pipeline, facilitates communication and collaboration, and strengthens alignment between university strategy and technology decisions. Viewing all of the IT projects at once will enable UNLV to balance the risks and opportunities in its IT project portfolio. Much like a balanced financial investment strategy, a balanced IT

4. IT Projects

portfolio should include a mix of projects that introduce innovation, keep the infrastructure agile, and provide enhancements to the foundational enterprise systems.

While there should be different portfolios and different approval processes for IT projects of different sizes and complexity, a single intake process and a single tracking system for all IT projects are recommended. The university will be better able to manage IT resources and ensure that the IT investments are aligned with strategic priorities if projects of all sizes are contained within the same system. A business case submission is recommended for all projects regardless of size. After the initial intake process, projects can be routed for review, and requestors may be asked to provide additional documentation based on the size and scope of the project.

The review of IT projects. To provide a level of review, approval, and monitoring consistent with the size and scope of the projects, four project portfolios are recommended. Information from all four portfolios should be summarized within a single dashboard. The figure below provides a high-level overview of the IT project approval process and the four portfolios.



The process includes a single project request submittal process. After submission, projects are routed to the appropriate group for review, approval, prioritization, and tracking. Details are provided in Appendix 4A.

Application development projects. Projects of all sizes and scopes require varying levels of application development and will be found in all four portfolios. Many of these projects involve data from disparate systems that are brought together, transformed, and then made available for use by various constituents to complete a business transaction or provide information to decision makers in some type of report. Examples include:

- Mobile application requests (see Initiative 11)

4. IT Projects

- Interfaces between enterprise applications (e.g., MyUNLV, WebCampus, Workday) and other software applications used across campus (e.g., myUNLV, Archibus, Resource25)
- Modifications to enterprise applications (e.g., MyUNLV, Data Warehouse)
- Applications developed in house for specific UNLV needs (e.g., RAVE - Rebel Announcements Via Email)

These types of projects depend on:

- Coordination of application development staff across campus
- Efficient data governance processes that define data elements and authorized access
- Effective reporting processes and tools

UNLV's new IT Service Catalog's delineation of available application development services will facilitate the identification and coordination of the necessary development resources to complete these projects (see Initiative 5). To ensure accurate, consistent, and appropriately authorized use of campus data in the application development process, a seamless integration with data governance and reporting processes is imperative (see Initiative 13). The new project review process will include steps that ensure application development resources are available and data needs are considered.

Purchasing approval for IT investments. Few technology systems exist in isolation. Interoperability, security, usability, suitability for the defined purpose, on-going maintenance, support, and the ability to expand for future uses all impact the cost and value of a technology purchase. Currently, many of the conditions necessary to ensure the success of the implementation of a technology system are not considered before the technology is purchased.

To ensure that campus priorities drive new projects, new purchasing policies, guidelines, and approval processes for IT purchases need to be developed. Examples of projects likely requiring review and approval include:

- New applications that require interfaces with the major campus information systems (student, human resources, finance, learning management, etc.)
- Technologies that require significant network bandwidth (e.g., video streaming, lecture capture, security cameras, telephony solutions)
- Projects valued above an established cost threshold (Note: Different thresholds will be set for different types of technology purchases)
- New enterprise services to be used by a majority of campus departments (e.g., document management, digital signage)
- Applications, systems, or new technologies that require central IT staff expertise (e.g., system administrators, storage specialists, database administrators, software developers) to implement, support, maintain, and/or enhance
- Technologies that require users to contact the IT Help Desk for the first level of assistance (e.g., password resets, web browser issues, software installation)

To manage the unique aspects of IT contracts and IT purchases, defined thresholds for triggering the approval processes will need to be identified and communicated. Developing the policies and approval processes will require close collaboration between the Chief Information Officer (CIO), the IT

4. IT Projects

governance groups, and UNLV's Purchasing and Contracts department. The processes should include business case analysis, an approval process workflow, and a visual model that informs the requester of the mechanics of the process.

Once the policies and approval processes are in place, the Technology Review Board (TRB) will be responsible for establishing and maintaining technology standards and developing the processes for providing the required technical reviews in a timely fashion. The establishment of the standards and the technical review processes will help the university choose technology that works well with existing systems and services. The standards will also allow Purchasing to broker contracts for preferred vendor pricing. Adding purchasing approval to the IT governance processes will help align technology investments with strategic goals and provide the purchasing guidance necessary to assure maximum value from IT investments.

Additional considerations. Discussions with the UNLV community indicate that the university struggles under a purchasing process that is heavily weighted with procedures to ensure compliance with required state purchasing regulations. Adding a technology review for technology purchases must be carefully orchestrated to improve decision-making without adding additional delays or over burdening staff.

Initiative Owner	Chief Information Officer
Consultative Role	Technology Advisory Committee, Technology Review Board, Finance & Business Division, Purchasing & Contracts Department

Budget Estimate

New IT project review processes may generate cost savings by using existing technologies to meet new service requests and by avoiding duplication of services. Cost savings may be difficult to quantify, as the resources saved are likely to be employed to alleviate the large backlog of IT projects in the queue.

New IT purchasing processes may also provide some cost savings. The savings will derive from economies of scale (e.g., setting printer standards that allow for better pricing toner and ink) and cost avoidance (e.g., meeting needs by making modifications to existing systems rather than purchasing new products). An initial investment of staff time will be required to develop and implement the proposed processes.

A Project Portfolio Management tool needs to be procured and implemented. Tools of the size and complexity needed to manage multiple portfolios typically cost approximately \$80,000 for implementation and \$13,000 annually for a solution managed by UNLV or \$30,000 for a hosted solution managed by a vendor.

Oversight and management of the IT Project Approval process requires at least one full-time staff position. The position would report to the CIO. The IT Portfolio Coordinator position currently residing in the OIT could be repurposed to fill this role.

New Positions: 0 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$124,230

4. IT Projects
Action Items to Implement Initiative
<ol style="list-style-type: none"> 1. Implement an IT project review process that accommodates projects of varying size and complexity. 2. Select and implement a Project Portfolio Management (PPM) tool. 3. Implement a threshold-based IT purchasing approval process that expedites IT purchases. 4. Annually review both the IT project review and IT purchasing approval processes for continuous improvement.
Anticipated Benefits
<ul style="list-style-type: none"> • Improved security and usability of technology investments. • Prioritization of IT projects is driven by university strategic goals. • Better utilization of IT resources. • Improved predictability and accountability for project delivery. • Interoperability needs inform technology decisions. • More seamless IT services. • Technology standardization leverages favorable pricing. • Quicker implementation of new technology and system enhancements. • New technology investment decisions reflect total cost of ownership.
Measures of Success
<ul style="list-style-type: none"> ☑ The annual IT budget analysis shows cost savings realized and costs avoided. ☑ Increasing stakeholder satisfaction with the IT project review process. ☑ Growth in the number of projects submitted through the IT project review process. ☑ IT purchasing approval process meets established timelines. ☑ Technology project portfolio aligns with university strategic goals. ☑ Increase in the percentage of projects delivered on schedule and within budget.
Contextual Information
<p>Peer institution research. Arizona State University (ASU) and George Mason University (GMU) both have well defined project approval processes as well as the tools and staffing to ensure project selection and implementation meet the needs of their respective institutions. ASU has a Planning and Program Management Office (PPMO) dedicated to project selection and execution. The office utilizes Planview as its project portfolio management tool. Established in 2011, the PPMO is managed by an Assistant Vice President reporting to the CIO and has a staff of fifteen including three quality assurance staff, one staff member for PPMO communications, and one staff member responsible for data management. GMU also has a well-defined project management framework and a Project Management Office (PMO) within the Security and Project Management unit of the IT organization. The PMO has five staff</p>

4. IT Projects

members reporting to an Executive Director responsible for the PMO. GMU utilizes Microsoft Enterprise Project Management Solution as its project portfolio management tool.

Many IT projects involve the implementation of new software. To ensure new software works with existing systems, ASU implemented a policy to verify that all software programs are compatible with the institution's single sign-on portal. To help maintain software standards in a distributed IT environment, GMU has a committee in place to review all software purchases to ensure the new software will interface with the institution's ERP system.

SECTION 2 – CREATING SUSTAINABLE IT SERVICES

IT Master Plan initiatives in Section 2 focus on strengthening processes and practices to improve IT service delivery and usability by coordinating services, sustaining technology investments, and increasing awareness and training.

5. IT Service Coordination	Improve the coordination of campus IT services by developing an IT Service Portfolio and an IT Service Catalog to optimize both distributed and centralized technology services.
6. Sustaining Technology Investments	Sustain both distributed and central IT investments, optimize technology refresh cycles, leverage technology standards, and support the introduction of new and emerging technologies. Design funding models to support a strategic approach to sustaining technology.
7. IT Awareness and Training	Increase awareness of available IT services, strengthen technology training, and provide timely, targeted communication about technology.

5. IT Service Coordination

Improve the coordination of campus IT services by developing an IT Service Portfolio and an IT Service Catalog to optimize both distributed and centralized technology services.

UNLV's IT services are provided locally by technical staff housed within individual campus units, centrally by the Office of Information Technology (OIT), and in partnership with external providers. A mix of distributed, centralized, and externally provided services is an effective means of meeting both shared and discipline-specific needs of a large, research-intensive university, particularly when the services are well coordinated.

The growing need. During the IT master planning discussions students, faculty, and technology professionals from across campus indicated that they were not aware of the full range of IT services available at UNLV. The participants also expressed a desire to partner more effectively to address the specialized needs of local units through activities such as:

- Consolidating software licensing to leverage purchasing options
- Facilitating user groups for staff using similar technologies
- Bringing together campus units that provide similar services to understand where services overlap, where there are service gaps, and what can be done to create more seamless services (e.g., data storage for research faculty)

Top Tier initiatives will increase the number of new faculty and the emphasis on inter-departmental collaboration, heightening the importance of providing a comprehensive picture of all available IT services. Additionally, new instructional technologies, more sophisticated communication tools, technology-based advising approaches, and comprehensive data analytic tools emerging from Retention, Progression, and Completion (RPC) efforts will increase the unique technical expertise needed on campus.

There is a clear and growing need to build stronger collaborations, increase organizational effectiveness, and provide better awareness of available technology resources and services.

Recommended changes include:

- Providing new leadership and governance within the technology community
- Orchestrating activities to create a culture of collaboration
- Increasing visibility into available IT services
- Introducing new tools to facilitate access to IT services

Leadership and culture. The ability to create and sustain a comprehensive approach to providing the full range of IT services needed at UNLV depends on a commitment by technology groups to work together. Under the leadership of the Chief Information Officer (CIO), the Technology Advisory Committee (TAC) has been charged with optimizing distributed and central IT resources (See Initiatives 1 and 3). The success of the efforts depends on creating and sustaining a culture of transparency and cooperation within the technology service providers on campus and key strategic technology partners from the community.

In the short run, the focus will be on increasing awareness of all available IT services through the development of an IT Service Portfolio and an comprehensive IT Service Catalog. Over time, the efforts will result in new organizational structures and collaborative partnerships designed to:

5. IT Service Coordination

- Leverage support for converged technologies (e.g., hyper-converged IT infrastructure, unified communications)
- Reduce duplication of effort
- Increase resources available for discipline-specific technology needs
- Provide coordinated IT services offered through the collaborative efforts of both distributed and central IT units

Increased visibility and better access to IT services. Current efforts to coordinate IT services are generally informal and are based on relationships between the individuals providing the services. These relationships have served the campus well. However, the university has grown beyond the ability of informal networks to support the complex array of individual and shared IT service needs.

The initial effort in improving the coordination of IT services is to increase awareness of what services are currently available and how best to access those services. The development of an IT Services Portfolio is recommended as a best practice for increasing awareness. The creation and maintenance of a comprehensive IT Services Catalog is recommended as a best practice for improving access to needed services. Table 5-1 provides more information about the portfolio and the catalog.

Table 5-1: Features of IT Service Portfolio and IT Service Catalog

IT Service Portfolio	IT Service Catalog
<p>The portfolio provides information about:</p> <ul style="list-style-type: none"> • Existing services • New services under consideration • Planning details related to service improvement initiatives • Schedules for decommissioning existing services • Interdependencies between complex services 	<p>The catalog:</p> <ul style="list-style-type: none"> • Lists all current services • Enables users to browse, select, and initiate services • Has an external facing presence that describes services intended for customers • Has an internal facing component that helps service providers respond to service requests

Together, the portfolio and the catalog will provide the campus with a clear picture of what IT services exist, what new IT services are being planned, how to access the services, and who is responsible for providing the services.

The IT Service Portfolio - Once developed, the IT Service Portfolio will enable the university to more effectively manage services from conception to retirement. Clarifying the interdependence of complex services will enable service providers to work together to avoid unintended consequences of planned service changes and provide quicker restoration of all services when incidents occur. The IT Service Portfolio will also serve as a reference when making decisions regarding staffing and resource allocation and will act as a baseline for technology governance decisions that relate to technology services.

5. IT Service Coordination

The IT Service Catalog - Some of the confusion university personnel expressed in finding services and obtaining assistance with existing services is a by-product of UNLV's highly distributed and complex network of IT service providers. A comprehensive catalog must include: localized IT services; campus-wide IT services provided by academic or administrative units; centrally delivered IT services; complex IT services offered through a collaboration of two or more units; and external IT services offered by community partners and brokered through one or more campus units.

Detailed information about the development and maintenance of the IT Service Portfolio and the IT Service Catalog are contained in Appendix 5A.

Optimizing the coordination of IT services. During the process of developing the portfolio and the catalog, information about redundant, overlapping, missing, and outdated services will emerge. In some cases, redundant and overlapping services may be able to be restructured or optimized and any realized gains in existing resources reallocated to fill in gaps. In other cases, new resources will be needed to fill gaps or provide new services. In still other cases, changing campus direction and evolving technology requirements will expedite the decommissioning of existing services.

New governance committees will have to determine how to manage the needs exposed by greater visibility into the IT service environment. Priorities for meeting service gaps will need to be established. New organizational structures and/or collaborations will need to be developed. Resources to meet the identified and anticipated needs will have to be secured. Finally, ongoing assessment is required to ensure that the efforts are: increasing the awareness of available IT services; making it easier to access IT services; and raising the satisfaction with the provision of IT services.

Initiative Owner	Chief Information Officer
Consultative Role	Technology Advisory Committee, Technology Review Board, Distributed IT Staff, OIT

Budget Estimate

Funding will be needed for technologies and implementation services related to creating and maintaining the IT Service Portfolio and the IT Service Catalog. The costs will depend on which platform the university decides to use for developing and managing the portfolio and the catalog. For the IT Service Portfolio, it may be possible to use the same application that is selected for the IT Project Portfolio (see Initiative 4). Funds may be needed for the additional licensing that would be required for maintaining two portfolios in the same software. If separate tools are needed, a hosted IT Service Portfolio tool is about \$50,000 annually.

To help with the development of the IT Service Catalog, many universities have been able to leverage their existing service management software application. If Footprints, the service management solution used at UNLV, has the functionality needed then no software purchase will be necessary. However, consulting resources will be needed to configure the existing software for use as an IT Service Catalog. If Footprints does not have the required functionality, the costs for an IT Service Catalog tool ranges from \$50,000 to \$100,000 plus 20% annual maintenance. Hardware will cost approximately \$11,000 plus \$2,200 annually.

One additional staff member (approximately \$60,000 plus benefits) will be required to maintain and

5. IT Service Coordination

expand the IT Service Portfolio and IT Service Catalog.

New Positions: 1 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$598,295

Action Items to Implement Initiative

1. Develop an inventory of current technology services campus wide.
2. Develop an inventory of current technology professionals campus wide.
3. Implement an IT Service Portfolio management tool.
4. Create the initial IT Service Portfolio.
5. Implement an IT Service Catalog tool.
6. Create the initial IT Service Catalog.
7. Annually review the IT Service Catalog for obsolete services, baseline services, and service gaps.
8. Publicize the process for updating the IT Service Portfolio and the IT Service Catalog.
9. Conduct annual reviews of the portfolio and the catalog.

Anticipated Benefits

- Better awareness of and easier access to IT services for all campus constituents.
- Higher satisfaction for customers using complex services supported by multiple campus units.
- Clearer accountability for IT service provision due to delineation of services by service owner.
- Improved ability to align IT resources to meet changing customer and university needs.
- Potential to reallocate resources by reducing duplication of effort.

Measures of Success

- ☒ Improvements in awareness of IT services.
- ☒ Improvements in customer knowledge of how to access IT services.
- ☒ Improved support for complex IT services that cross multiple campus units.
- ☒ High scores on usability testing of the IT Service Catalog.
- ☒ IT Service Catalog usage statistics show increased volume of traffic.
- ☒ Resources reallocated through identification and consolidation of redundant technology services.

Contextual Information

Peer Institution Research. George Mason University (GMU) has a service catalog online, accessible at the following website: <http://itservices.gmu.edu/>. The catalog separates the services by category, examples being “Business Applications” and “IT Security.” The category titles are user friendly enabling users to search for services by category, alphabetically, or by constituent (i.e., student, faculty, staff). Central IT assesses the value of the catalog via user feedback.

Both GMU and Arizona State University (ASU) have Service Level Agreements in place between

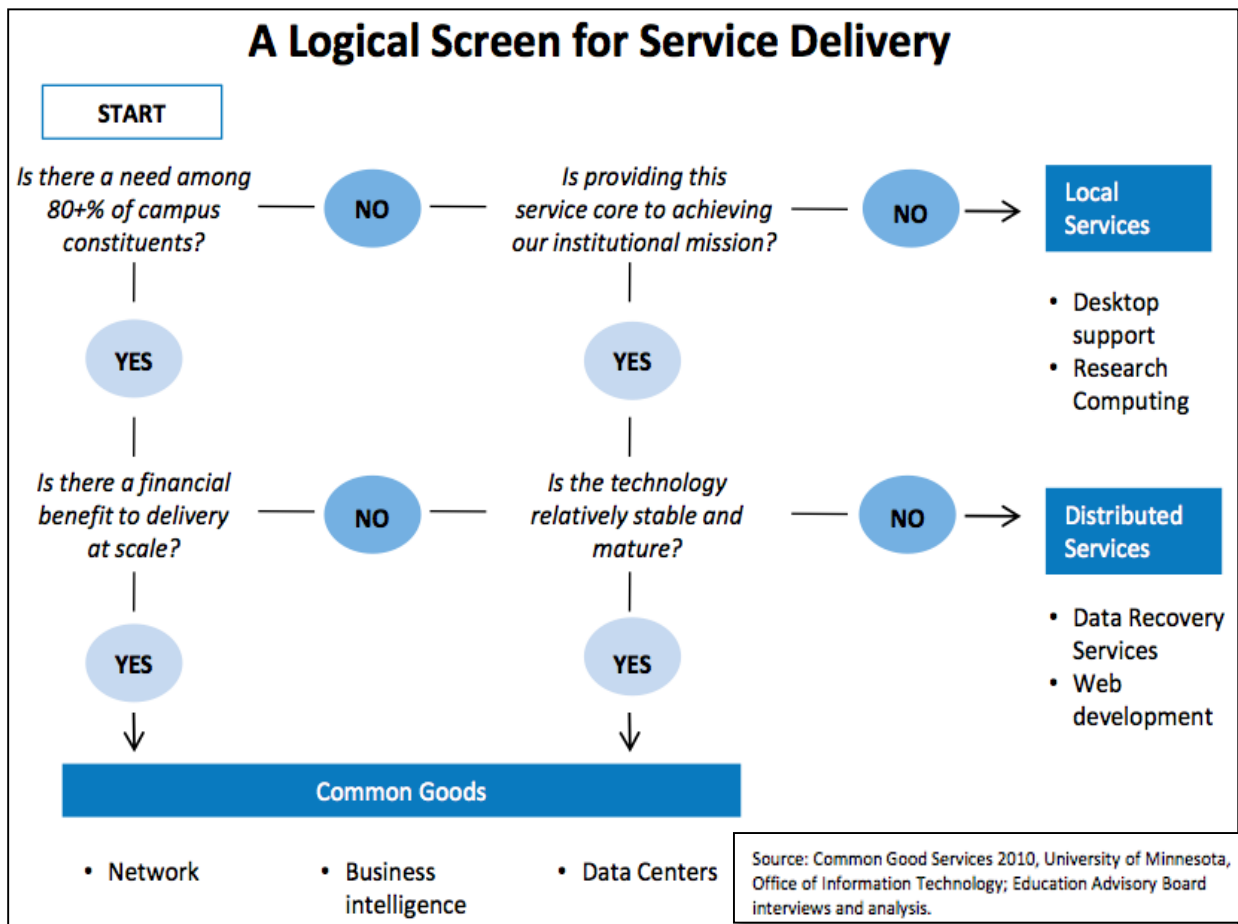
5. IT Service Coordination

central IT and their customers, some of which include “fee for service” agreements such as desktop support, while others were drafted with individual customers for server hosting services.

Other relevant research. The University of Minnesota delivers a bundle of “common good services” to all units on campus. Services are funded through an enterprise cost pool paid on a per headcount basis by all units regardless of actual consumption. Representatives from campus units collectively determine the composition of the common good services bundle.

Units fund the common good services bundle based on the opportunity for use rather than metered consumption, providing a stable funding base for the central IT organization and creating a financial incentive for unit adoption. Figure 5-1 illustrates how the University of Minnesota uses a logical screening process for determining which services are best provisioned by central IT and which services are best provisioned by distributed IT.

Figure 5-1: Determining Common Good Services



The University of Minnesota offers over 50 Common Good Services and continues to add services to the list. A recent list is contained in Appendix 5B.

6. Sustaining Technology Investments

Sustain both distributed and central IT investments, optimize technology refresh cycles, leverage technology standards, and support the introduction of new and emerging technologies. Design funding models to support a strategic approach to sustaining technology.

Significant investment in new technologies and a solid technology foundation will be required to support many of the Top Tier initiatives (e.g., Retention, Progression and Completion, UNLV School of Medicine, the influx of new faculty, additional research programs, etc.). Sustaining that investment is critical to the long-term success of Top Tier. UNLV must develop a comprehensive strategic approach to sustaining technology investments. The approach must include mechanisms to:

- Renew critical network, server/storage, and wireless infrastructure
- Systematically refresh end-user devices
- Sustain new investments

Adopting a new approach, while challenging, will:

- Ensure services are delivered on modern, reliable, secure, vendor-supported IT infrastructure that minimizes the likelihood of service disruptions
- Support timely, cost-effective, need-based expansion of services (e.g., speed, capacity, new investigators, video)
- Optimize interoperability
- Ensure students, faculty, and staff have access to the technologies they need to excel in their university roles
- Include sufficient standardization to support collaboration across units
- Provide the flexibility to adapt to emerging needs and specialized services
- Facilitate adoption of new technology
- Support innovation and experimentation
- Optimize infrastructure purchases to address multiple needs and reduce hidden costs
- Free IT personnel to redirect time spent sustaining equipment that has exceeded its lifespan to focus on providing services that improve student success, teaching, and research

Current environment. The 2013 Current Information Technology Environment Report indicated that outdated equipment and a lack of coordinated planning for new acquisitions are impacting the university's ability to deploy, support, and utilize both existing and new technology. Furthermore, students, faculty, and staff reported that the challenges created by aging equipment, lack of standardization, lack of integration between existing and new systems, and insufficient support discouraged them from adopting unfamiliar or new technology.

Critical Enterprise Infrastructure. A substantial decrease in one-time funds allocated to technology has intensified the needs highlighted in the 2013 environment report. Three enterprise infrastructure environments are at risk - the campus network, the server and storage environments, and the wireless deployment.

Network - Over 88% of the campus network infrastructure has reached end-of-life. The ability to add additional connections to the network is diminishing. More detrimental is the inability to use the network to create unique pathways that can help protect the most sensitive campus information, support

6. Sustaining Technology Investments

wireless expansion, move large amounts of data, and/or allow uninterrupted connections for investigators accessing resources off campus.

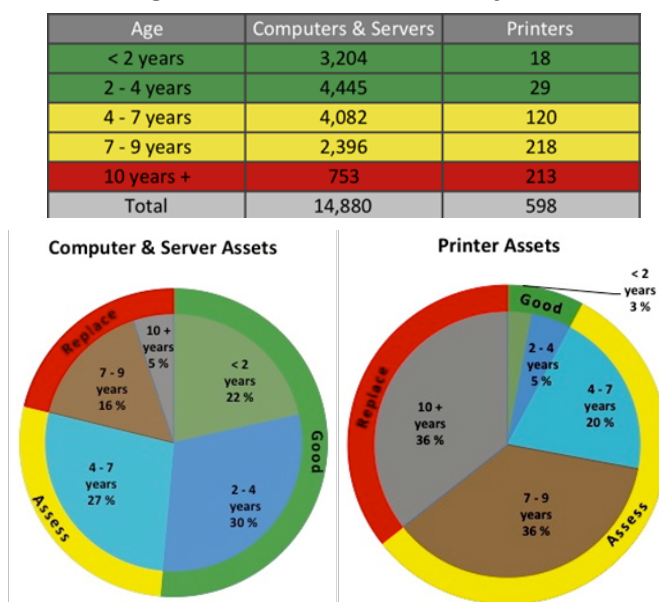
Servers/Storage - Half of the current server and storage environments are end-of-life or will be within two years. Additionally, over one third of the server infrastructure and half of the storage infrastructure has reached capacity. The growing demand for more servers and increasing storage capacity can only be met with additional equipment. The campus data centers do not have the cooling or power necessary to support the newer, more efficient equipment.

Wireless - Approximately 30% of the indoor spaces and 80% of the outdoor spaces have no wireless at all. Seventy-five percent of the existing wireless access points are end-of-life and the infrastructure has insufficient capacity to support the growing number of wireless devices on campus (65,000 wireless device connections per month). A complete wireless infrastructure redesign is needed.

Options for addressing these critical infrastructure needs are under discussion. More details are contained in Appendix 6B.

Commonly Used IT Assets. The devices students, faculty, and staff utilize for their daily activities have also reached or are approaching end-of-life. In 2014 UNLV had over 16,000 information technology assets (e.g., computers, servers, switches, printers, tablets, projectors, digital displays, etc.). Information about the most commonly used technology assets in that 2014 survey is included in the figure below.

Figure 6-1: Number, Age, and Status of Commonly Used IT Assets at UNLV



New model for sustaining IT investments. Building a Top Tier technology environment requires more than replacing outdated technology on a set schedule to prevent outages or reduce costs. It requires re-envisioning the way in which technology renewal, expansion, and replacement is implemented and funded. A new model for sustaining IT investments includes:

- Technology standards that:
 - Help UNLV choose technology that works well with existing systems

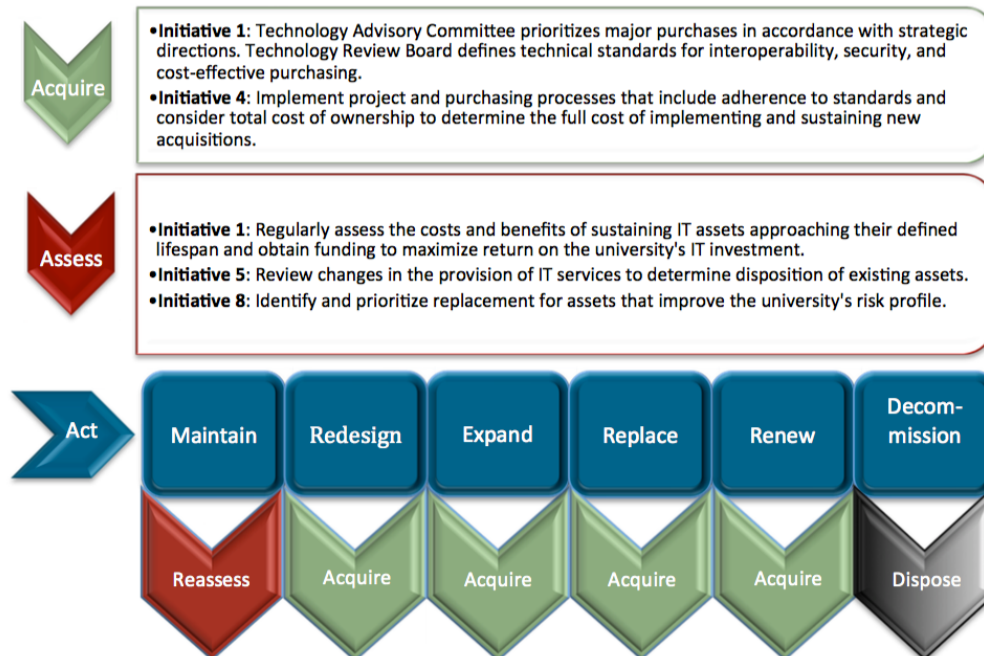
6. Sustaining Technology Investments

- Enhance service provision by reducing variability
- Allow UNLV to broker contracts for preferred vendor pricing
- Ensure that evolving information technology security requirements are addressed
- Regular assessments of UNLV's IT investments to:
 - Identify technologies that need to be decommissioned
 - Determine when fundamental infrastructure needs to be re-architected
 - Pursue opportunities for consolidation of technology investments
 - Determine when to adopt emerging technologies
- Funding models that:
 - Address the shared and unique needs of UNLV's distributed and central IT environments
 - Optimize technology refresh programs throughout the institution
 - Anticipate the costs associated with major shifts in the provision of infrastructure services
 - Account for maintenance and renewal costs of grant-funded equipment used to provide on-going university services

More details about each of the components of the model are provided in Appendix 6B.

Interdependencies with other Plan initiatives. The new model for sustaining IT investments builds upon the foundation established by several IT Master Plan initiatives. Figure 6-2 summarizes the lifecycle of sustaining IT investments and highlights the interdependencies.

Figure 6-2: Role of UNLV IT Master Plan Initiatives in Lifecycle of Sustaining IT Investments



Successful implementation of the initiatives provides a sustainable technology foundation that ensures members of the UNLV community have the secure and reliable technology needed to perform their

6. Sustaining Technology Investments

work.

Maximizing the IT investments at UNLV is one of the major charges of the Technology Advisory Committee (TAC) described in Initiative 1. Creating funding models is part of that charge. The TAC will be assisted in its efforts by the Technology Review Board (TRB).

Initiative Owner	Chief Information Officer
Consultative Role	Technology Advisory Committee, Technology Review Board, Property Control, Purchasing Office

Budget Estimate

The critical state of network, server/storage, and wireless infrastructure requires immediate attention. Approximate costs are \$14.5 million one-time over three years. Five-year maintenance costs on infrastructure improvements total \$382,924.

New staff resources (3 FTE) will be needed to implement and support the network, data center, and server/storage infrastructure improvements. Annual costs without benefits are approximately \$205,000. Appendix 6B includes details of those infrastructure costs and sourcing strategies that could potentially reduce the overall cost.

The IT asset inventory shown in Figure 6-1 includes approximately 16,000 items with an initial purchase price of \$38.2 million. Standard refresh cycles vary from three to ten years depending on the type of equipment. An average refresh rate across all types of equipment of six years was used to develop a rough estimate of costs.*

Using a refresh rate of six years for all IT assets, approximately \$6.4 million per year would be needed to sustain the current IT investment using standard technology refresh cycles. Though these estimates are approximate, they help convey the scope of the technology refresh challenge at UNLV. An additional \$2 million per year beginning in FY18 is included in the Plan budget to begin to address the ongoing need.

The university is likely to continue to use one-time funding to meet the most pressing technology replacement needs. However, a phased approach to securing sustainable funding sources should be developed. Creating optimized technology refresh programs for each type of technology and regularly assessing the state of the overall IT investment for opportunities for decommissioning and consolidating could help maximize the available funds whether they be one-time or recurring. Refer to Section 5 and Appendix D for more considerations on resource options.

New Positions: 3 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$20,578,678

* The six-year average is based on Federal guidelines of five to ten years for items such as computers, servers, and network switches and two to eight years for items such as printers, projectors, and wireless access points. The six-year average is for cost estimation only. Actual refresh rates depend on type of equipment (see the Contextual Information section below).

Action Items to Implement Initiative

1. Provide off campus data center services.
2. Re-architect the UNLV network for current needs and future growth.
3. Implement robust infrastructure management tools.

6. Sustaining Technology Investments

4. Develop funding models to effectively sustain IT investments.
5. Implement a technology refresh strategy.
6. Establish campus technology standards.
7. Annually assess IT investments to determine when to decommission services, consolidate services, and introduce new technologies.
8. Annually update policies, procedures, and standards for IT purchases.

Anticipated Benefits

- A technology environment optimized to support campus strategic directions.
- Increased security, functionality, and reliability of technology as end-of-life equipment is eliminated.
- Improved ability to implement new technology services.
- Better IT service provision for standardized technology investments.
- Cost recovery from decommissioned technology services.
- Cost savings and improved service provision through consolidated technology services.
- Reduced IT infrastructure complexity through hardware standardization.
- Increased compatibility between existing IT systems.

Measures of Success

- ☒ Predictable funding sources to sustain the campus IT investment.
- ☒ Reduced costs through adherence to technology standards.
- ☒ Reduction in the percentage of outdated and at-risk technology on campus.
- ☒ Reduction in workarounds associated with new technologies not compatible with outdated technology.
- ☒ Increased percentage of IT acquisitions meeting IT standards and compatible with campus systems.

Contextual Information

Peer institution research. Arizona State university (ASU) has a computer and audio-visual refresh program. Computers in student-use areas are included in the refresh program. The program targets open-use computing facilities for students and university classrooms.

IT currently contributes \$500,000 annually to the refresh program. The university has instituted a phased program utilizing sources outside of IT to raise the total annual contribution to \$1.8 million by year four. A portion of the increased investment will be funded through the Student Technology Fee.

Other relevant research. The following table provides an overview of refresh cycles. It should be fine-tuned to meet the specific technology needs and requirements of UNLV.

6. Sustaining Technology Investments

Guide for Considering IT Upgrades, Disposals, or Purchases

Asset Category	Asset Type	Refresh Cycle
Computers	Desktop Computers	3-5 years
	Laptop Computers & Mobile Devices (iPhone and iPad)	2-3 years
	Printers (all multifunction devices)	5-8 years
	Thin Clients (Virtual Desktop Infrastructure)	6-8 years
Classroom Equipment	Projectors	4-6 years
	Interactive Whiteboards	6-9 years
Network Equipment	Servers & Security Equipment (NAC, firewalls, and IPS)	3-5 years
	Wireless Access	3-5 years
	VoIP Phones	3-5 years

Data from: Nancy Gunza, "High Tech, High Stakes," Business Officer, September 2012.

7. IT Awareness and Training

Increase awareness of available IT services, strengthen technology training, and provide timely, targeted communication about technology.

Strategic investment in technology tools, decision-making processes, and institutional policies provides the raw materials for an optimal technology environment. The value that technology investment delivers ultimately depends on the university community's ability to utilize the available resources to realize Top Tier, Retention, Progression, and Completion, Academic Health Center, and other strategic goals.

UNLV's largest investment and most significant asset is the talented community of students, faculty, and staff diligently selected to advance the institutional mission. The university needs to leverage and empower that community to make the most of its technology investment by:

- Actively promoting awareness of available IT services
- Strengthening technology training
- Providing timely, targeted communication about technology changes

These improvements will ensure that both end users and technical staff are able to utilize available technology to the fullest potential.

Awareness. One of the more surprising findings during IT strategy discussions with campus constituents was how often the participants shared their need or desire for IT services that already existed on campus. The highly distributed nature of IT at UNLV combined with the rapidly changing technology landscape makes it difficult to keep the campus apprised of technology changes. To help campus constituents make effective use of UNLV's technology investment, the university should increase IT awareness in four key areas:

1. Available IT services
2. Timely security concerns
3. New technologies being introduced on campus
4. Emerging technologies being considered for future adoption

1. Available IT services - The development and maintenance of an IT Service Catalog containing the full range of distributed and central IT services is a crucial first step in promoting awareness of available IT services (see Initiative 5). The new, easy to navigate catalog will help campus constituents identify and access existing services. Linking self-help materials and just-in-time hands-on training to the service listings will further improve understanding and use of the services presented.

These self-help tools should be augmented with human assistance. The IT Help Desk staff will require sufficient information to field questions for both the distributed and central services included in the catalog. Ultimately, the Chief Information Officer (CIO) is responsible for the IT Service Catalog including the efforts required to keep the campus apprised of its continuously changing content.

2. Security awareness – UNLV employees need to understand and adhere to new legislation and related policies for safeguarding university information. Helping employees change behavior to

7. IT Awareness and Training

meet these rapidly evolving expectations requires security awareness efforts that are multi-faceted, targeted by audience, persistent, and repetitive without becoming relegated to the status of informational background noise. An awareness program that emphasizes collective responsibility for IT security is an important component of UNLV's security strategy (see Initiative 8).

In 2015 the university launched the framework for an on-going security awareness campaign to help campus constituents understand the important role their actions play in the protection of data. For these efforts to have a sustained impact, the university must devote on-going resources to regularly refresh the security education, awareness, and training program content. Additionally on-going assessment of these efforts are recommended. The annual content review and assessment are the responsibility of the Chief Information Security Officer (CISO) and the new Cyber Security Team (see Initiative 8).

Effective security awareness efforts help students, faculty, researchers, and staff protect data and avoid problems that disrupt their work. Prevention is the best way to keep UNLV's talented community focused on the mission of the university.

3. New technologies - New technologies are continuously being introduced to the campus community at both the unit and enterprise levels. Increasing campus awareness of these changes will help UNLV optimize its use of new technologies.

If new technology adopted to help address a local need proves effective, it may spread and eventually become part of the enterprise technology infrastructure. Other new technologies may never leave the boundaries of a campus unit. In both cases, campus awareness of the technology as well as who to contact for information and support is important. Enforcing procedures that require new technologies be added to the IT Service Catalog will provide this awareness.

Introducing new technologies intended for adoption by large segments of the campus community (e.g., new human resources and financial systems - see Initiative 9) requires extensive awareness and training efforts. These efforts must start at the time the technology is being reviewed for adoption. The implementation plans must include details about how users will be introduced to the tools, trained, and supported both during and after the implementation. The new project review and prioritization process proposed in Initiative 4 will help ensure that awareness and training needs are part of all major technology implementations.

4. Planning for emerging technology – Currently, few good venues exist for informing the university community about what technologies are planned for the mid- and long-term future. Even fewer venues exist for the campus community to participate in discussions about acquiring or developing those technologies. Engaging the campus community in discussions about emerging technologies is an important component of the new leadership and planning structures described in Section 1 of the Plan.

These early discussions ensure that all major campus systems work together as seamlessly as possible. They also facilitate greater participation in creating an environment that supports and incentivizes experimentation and innovation in the classroom, the laboratory, the field, and the community.

7. IT Awareness and Training

Training. For some members of the university community, simply being aware that a particular technology exists and how to gain access is all that is needed. For others, initial training and help with use are critical for successful adoption and ongoing use of that technology.

As UNLV develops additional IT training, orientation, and professional development opportunities for students, faculty, and staff, attention must be paid to the way training is being transformed by technology. Traditional classroom-based training is diminishing and will be augmented with online content delivery, video links, and simulations. Learning will be embedded into everyday activities. Social media will play a more prevalent role in how and when individuals learn. Those involved in implementing training and professional development activities on campus will be able to leverage these pedagogical tools to create a learning environment that is:

- Flexible
- Enabled by technology
- Focused on role-based responsibilities
- Able to accommodate multiple learning styles

For the majority of students, faculty, and staff the technologies they must learn are tools that enable them to competently achieve their academic, administrative, and professional tasks. Learning outcomes should focus on quickly understanding how to utilize a technology to achieve other goals, rather than on mastering the technology. In order to realize these learning outcomes, effective technical training must:

- Be easy to find
- Be available just when needed
- Take into consideration individual learning styles and constituent schedules
- Offer both hands-on and self-help options
- Focus on the outcomes student, faculty, and staff want to achieve
- Coordinate with professional development programs

Consequently, a comprehensive approach to providing technical training for students, faculty, and staff is recommended.

Technical training for students - Several units on campus operate independently to offer students training for the technologies they support (see Table 7-1). Greater emphasis needs to be placed on coordinating the available training opportunities for students. The coordinated training should be regularly assessed to improve delivery, identify gaps, and create easier ways for students to identify the full scope of available training opportunities.

7. IT Awareness and Training

Table 7-1: UNLV Student Technology Training Services

Type of Service	Available IT Training	UNLV Unit
MyUNLV	Online and in-person training for Admissions, Registration, Class Schedules, Transcripts, Financial Aid, Advising, and Student Finances	Enrollment & Student Services
Research Databases Multi-Media Resources Equipment Checkout	Training in technologies used for accessing in-print and online reference materials and major database; assistance with laptop and peripherals available for daily checkout	University Libraries
WebCampus Computer Labs Wireless	Tip sheets, online tutorials and other resources for WebCampus, as well as other major campus technologies; hands-on assistance from lab monitors in computer labs; individual assistance through the IT Help Desk	Office of Information Technology
IT Survey Courses	Courses introducing basic technologies and technical skills (e.g., word processing, spreadsheets, databases, computer programming)	Computer Science Management, Entrepreneurship & Technology
Discipline Specific Technology Courses	Courses offered by individual departments to teach technologies and associated technical skills most commonly used in their disciplines.	Academic Departments

In addition to the training described above, online training available through lynda.com can be used to help fill the gaps for students. It is recommended that the university work with faculty and students to increase awareness about how the available resources can be used to augment instruction and improve technical skillsets.

Technology orientation for students - Most students new to UNLV attend a campus orientation before they begin their first semester. The technology components of the orientation programs should be formally assessed to determine their effectiveness and provide insight into how they might be improved or enhanced to ensure that students are served by technology, not frustrated by it. Additionally, an online technology orientation should be developed for students unable to attend in-person orientation sessions and to provide students an easy-to-use introduction to campus technologies to be accessed anytime. An important component of that online orientation is an introduction to the functionality in WebCampus.

Training for faculty and staff – Similar to the student training offerings, various campus units provide faculty and staff training on the most widely used technologies. The training would benefit from better coordination. Additionally, it is recommended that information about available training be included in the IT Service Catalog.

Technology orientation for faculty and staff – New faculty are invited to attend an orientation at the start of the fall semester, which includes a brief review of campus technologies. While the new

7. IT Awareness and Training

faculty orientation is important for getting faculty off to a good start each academic year, no such program exists for faculty hired at other times of the year. Additionally, the program does not include graduate assistants with teaching responsibilities, part-time instructors, administrative faculty, or classified staff.

It is recommended that UNLV develop a technology orientation for new employees to be completed within a month of the start of employment. It is further recommended that the orientation be offered both in-person and online to accommodate learning styles and schedules. Content for the orientation should be developed in collaboration with the Technology Review Board and the Cyber Security Team and piloted with substantial feedback from Human Resources and other appropriate units on campus. Orientations for faculty should include information about accessing additional training, professional development, and mentorship opportunities designed to support their individual academic pursuits.

Professional development for faculty - Efforts to assist faculty with their technology needs must go beyond training on how to use specific tools. To provide faculty the assistance they need to incorporate instructional and research technologies effectively into academic environments, UNLV needs to strengthen ties between those providing technical training and those providing professional development. Increased collaboration between the Coordinator of Instructional Development and Research, the UNLV Libraries, Online Education, and OIT is recommended.

Training for IT service providers - Ensuring that technical staff members stay abreast of the changes in the technology they support is important for providing a robust and reliable technology environment and for retaining staff. Maintaining the many technologies on campus requires continuous training and, in some cases, specific professional certifications. More coordination between distributed and central IT units to provide opportunities for cost-effective training is recommended. The coordination would have the added benefit of creating stronger relationships between members of the campus community who support the same types of technologies.

In addition to technical training, IT service providers also require training in project management, documentation, communication skills, team work, and customer service. Where possible, the university should take advantage of the expertise residing on campus to assist with both the technical and non-technical training needs.

Furthermore, the Continuing Education unit within the Division of Educational Outreach has been working with various members of the campus community to help determine what IT training needs exist in the local community and how best to meet those needs. With some coordination, that work could lead to more opportunities for cost-effective and convenient training for IT staff on the UNLV campus.

UNLV augments its formal training opportunities with memberships in national organizations for IT professionals. Table 7-2 includes information about UNLV's institutional memberships.

7. IT Awareness and Training

Table 7-2: UNLV Membership in National IT Professional Organizations

Organization	Brief Description	Eligibility
EDUCAUSE	EDUCAUSE is a nonprofit association of IT leaders and professionals. Its programs and services focus on analysis, advocacy, community building, professional development, and knowledge creation to support the transformative role that IT can play in higher education. educause.edu/user/login	All UNLV students, faculty, and staff
Internet2	Internet2 is a community of international leaders in research, academia, industry, and government who create and collaborate via innovative technologies. Members accelerate research discovery, advance national and global education, and improve the delivery of public services. www.internet2.edu/	All UNLV students, faculty, and staff
Gartner	Gartner is an IT research and advisory company for CIOs and senior IT leaders in corporations and government agencies, business leaders in high-tech and telecom enterprises, professional services firms, and technology investors. www.gartner.com	Senior leadership at UNLV
HEUG	The Higher Education User Group is a non-profit, international organization consisting of higher education institutions that use application software from Oracle. Members share information and experiences and leverage their voice to impact product expectations and directions. www.heug.org//pw/rs	All UNLV employees
Education Advisory Board IT Forum	The IT Forum provides research and advice for CIOs and IT leaders on leveraging information and technology to further the higher education mission. Members benefit from the experiences of thousands of other universities facing similar challenges. www.eab.com/research-and-insights/it-forum	All UNLV students, faculty, and staff for research studies

The services and resources provided by UNLV membership in the national IT professional organizations are currently underutilized. It is recommended that UNLV develop ways to share the available resources with both the IT community and the broader campus community.

Communication. Timely and targeted communication about a variety of technology topics is key to improving the technology environment at UNLV and a foundational component of many of the initiatives in the UNLV IT Master Plan. The communication effort should include:

- Enhancing the tools used for communication on campus (see Initiative 14)
- Increasing the available information regarding technology topics
- Developing channels of communication that allow for timely messaging to targeted audiences

New ways to provide information about timely technology matters such as planned outages (e.g., MyUNLV unavailable for maintenance) and security alerts that go only to those who are impacted (e.g., browser vulnerabilities) need to be developed. Individuals must be able to select the kind of technology information they want to receive as well as options for how they access that information. Over time, the implementation of an identity management solution should provide increased ability to create more individualized communication channels (see Initiative 10).

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Additionally, the recommendations for enhancing mobile access to university services should increase the options for access (see Initiative 11).

Increasing access to the information about all aspects of the technology environment at UNLV is included in the charges of both the Technology Advisory Committee (TAC) and the Technology Review Board (TRB) (see Initiative 1) and is a key requirement of the new Chief Information Officer (CIO) (see Initiative 3). Additionally, the proposed Cyber Security Team has responsibility for awareness, training, and communication with regard to information security (see Initiative 8).

Increasing communication and collaboration among IT professionals is important for creating a strong IT community at UNLV. The TRB should take an active role in increasing distributed IT's participation in IT Forum, an informal group comprised of technical staff from the campus, and in facilitating ad hoc groups around topics of mutual interest (e.g., mobility, web development, instructional technology).

Initiative Owner	Chief Information Officer
Consultative Role	Technology Advisory Committee, Technology Review Board, Cyber Security Team, Human Resources, Coordinator of Instructional Development and Research

Budget Estimate

Costs for the recommendations in this initiative are partially covered by the time and effort of existing IT staff, both distributed and central. Central IT has already purchased online training materials from the SANS Institute for use in the security awareness campaign at a cost of \$6,000 and will be using the existing learning management system to help deliver the training materials. Approximately \$50,000 annually will be needed to develop more online training materials that will include the use of video. A cost recovery rate for use of the learning management system is being developed to make it possible for any group on campus to use the tool for training purposes. The costs for new communication and collaboration tools are provided in Initiative 14.

Currently, UNLV has only one person dedicated to technical training for students, faculty, and staff. An additional staff person is needed to expand training around commonly used instructional technologies and facilitate professional development opportunities for the IT community. The salary range is approximately \$60,000 plus benefits.

New Positions: 1 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$ 464,863

Action Items to Implement Initiative

1. Increase awareness of IT services and IT training options
2. Implement TRB recommendations for training requirements to support technology changes.
3. Provide multiple IT training approaches (e.g., train-the-trainer, just-in-time, hands-on, self-help).
4. Annually refresh UNLV's IT security education, awareness, and training program.
5. Deliver technology orientation programs for new students, faculty, and staff.
6. Coordinate technical training and professional development opportunities.
7. Increase cost-effective professional development opportunities for the IT community.

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8. Annually assess the effectiveness of technology orientation and training programs.
9. Provide tools and opportunities for the IT community at UNLV to share expertise.
10. Increase utilization of resources available through UNLV's memberships in IT professional organizations (EDUCAUSE, Internet2, etc.).
11. Develop topic-based and audience-based communication mechanisms for timely notifications affecting technology services.

Anticipated Benefits

- End users and technical staff are able to utilize available technology to its fullest potential.
- A more secure technology environment through successful awareness efforts.
- More extensive use of the available features in new and existing technologies at UNLV.
- Technological experimentation and innovation in the classroom, the laboratory, the field, and the community are incentivized and supported.
- Faculty can refer students to online training to address gaps in student technical skills.
- IT services are delivered by well-trained experts with updated skills.

Measures of Success

- ☒ Increased awareness and utilization of available technology services at UNLV.
- ☒ Increased awareness of safe computing practices.
- ☒ Increased satisfaction with and confidence in using new campus technologies.
- ☒ High adoption rates for online technical training resources.
- ☒ High levels of satisfaction with new student technology orientations.
- ☒ High levels of satisfaction with new faculty and staff technology orientations.
- ☒ Increased participation in and satisfaction with IT professional training opportunities.
- ☒ Higher utilization of university memberships in national IT professional organizations.

Contextual Information

Peer Institution Research. At Arizona State University (ASU) many campus IT leaders are part of the "IT Council," a group that meets quarterly with the CIO. This council helps central IT communicate its functionality campus-wide. Several other committees interact with central IT to keep lines of communication open with departments outside of central IT.

Other relevant research. At Creighton University new students are provided access to an online technology orientation. The orientation is available via video and text and introduces students to the technology they need to get started. The training includes:

- Information security, passwords, and account management
- An introduction to the major software applications students use
- Other technology services (e.g., wireless, emergency alert system, printing)

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The full orientation is available online at: <http://doit.creighton.edu/doit-new-student-orientation>

On the 2016 EDUCAUSE Top-10 IT Issues List, “*Optimizing Educational Technology: Collaborating with faculty and academic leadership to understand and support innovations and changes in education and to optimize the use of technology in teaching and learning, including understanding the appropriate level of technology to use*” ranks at number two. The authors of the Top-10 list recommend that IT organizations take the following actions to address issues related to optimizing the use of technology in teaching and learning:

- *Implement practices (don't start with technologies) that strengthen relationships: faculty to student, student to student, faculty to faculty.*
- *Consider how faculty curate and create relevant content (and partner with libraries for this).*
- *Promote active involvement by students in and out of the classroom.*
- *Keep students on-task/invested/engaged/persisting.*
- *Partner with other service units, faculty affairs, and administration to*
 - *inventory best practices for promoting student engagement and persistence*
 - *probe for ideas for new practices*
 - *link existing practices to current and desired tools, services, support*
 - *pilot and evaluate new tools and services, which might be different by discipline.*
- *Tap into existing expertise in the faculty ranks, using effective practitioners as role models and facilitators.*
- *Provide appropriate and effective instructional design support and resources to maximize opportunities for effective use of technologies.*
- *Develop ways in which faculty and students can share their experiences with one another and showcase innovative uses to campus stakeholders and leadership.*

Grajek, Susan and the 2015-2016 EDUCAUSE IT Issues Panel, “*Top-10 IT Issues, 2016 Divest, Reinvest, and Differentiate*,” EDUCAUSE Review, January 2016, <http://www.educause.edu/research-and-publications/research/top-10-it-issues>

SECTION 3 – FOUNDATION FOR GROWTH AND AGILITY

IT Master Plan initiatives in Section 3 focus on creating a secure, integrated technology environment with easily accessible, user-friendly enterprise information systems, fewer logins, and increased mobility.

8. Information Security	Elevate the role for security planning and management beyond IT by creating a university-wide Cyber Security Team and CISO position empowered to implement a comprehensive security strategy designed to mitigate current and anticipated future risks.
9. iNtegrate 2	Implement new human resources and finance systems to reduce labor-intensive manual processes, decrease duplication of effort, improve tracking, and increase self-service options. The new systems are designed to integrate well with existing applications, improve data integrity, enhance security, and provide better access to information for decision-making and reporting.
10. Identity Management and Single Sign-On	Establish an identity management program to improve the efficiency of user account administration, increase information security, improve collaboration, and simplify access to resources and data.
11. Mobility	Meet the growing expectations for mobile access to information and services in a manner that is expeditious, secure, sustainable, and focused on improving university services.

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Elevate the role for security planning and management beyond IT by creating a university-wide Cyber Security Team and CISO position empowered to implement a comprehensive security strategy designed to mitigate current and anticipated future risks.

Information security concerns raised in a 2011 NSHE Network Security Audit of UNLV served as one of the catalysts for the development of the IT Master Plan. The lessons learned in completing the audit's recommended remediations have changed the security culture at UNLV. Those changes must be sustained and extended as part of the technology planning process.

Since the audit findings in 2011, more sophisticated threats, expanded use of digital data, increasingly interconnected systems, and the growing severity of the damage caused by successful attacks have elevated the need for a comprehensive campus-wide approach to securing UNLV's information assets. The approach must provide protection from unauthorized access while facilitating access for those authorized to use campus data. It must also help employees understand and meet their responsibilities for protecting the information assets under their care. Most importantly, the approach must be continuously adjusted to address evolving threats, new technologies, new compliance requirements, and emerging campus directions.

Continually strengthening the university's security posture in such a dynamic environment requires strong leadership, university-wide collaboration, and a proactive response to changing needs. To maintain the secure foundation established in response to the security audit and to continue to provide the security expected of a Top Tier institution, UNLV should:

1. Develop a comprehensive, proactive security strategy
2. Establish the role of a Chief Information Security Officer (CISO)
3. Form a UNLV Cyber Security Team
4. Sustain and extend the work of the NSHE Security Audit
5. Continually enhance security educational, training, and awareness programs
6. Establish and maintain ongoing risk assessment efforts

1. Develop a comprehensive security strategy. It is recommended that UNLV develop an agile security strategy that includes:

- Security solutions that cut across organizational boundaries
- A framework focused on protecting computing infrastructure, end points, and data
- Highly integrated multiple layers of protection
- Ongoing risk assessment
- Adherence to best practices
- Flexibility to address changing needs
- Mechanisms to incorporate new compliance requirements
- Ongoing alignment with campus strategic directions

Periodic assessment and revision of the strategy will ensure that it continues to adapt to new security risks.

2. Hire a Chief Information Security Officer (CISO). UNLV should establish the role of a CISO, a best

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practice for institutions as complex and large as UNLV. Creating a CISO position is integral to developing the security posture required for high profile research institutions and consistent with NSHE policy. The CISO will be responsible for instituting a strategic approach to sustaining security awareness, risk assessment, and compliance management programs. Cabinet approval for the authority of the CISO and associated office will be needed. Also in keeping with best practices, the CISO should report to the new CIO.

Clear authority for the CISO and well-defined responsibilities for a new CISO office are imperative. Recommended responsibilities include:

- Security analysis
- Forensic investigations
- Risk assessment
- Facilitation of the UNLV Cyber Security Team
- Oversight of compliance with federal, state, and local regulations (e.g., HIPAA, FERPA, NSHE, etc.)
- Development of and compliance with UNLV IT security policies and procedures
- Breach response management
- Security awareness

To be successful, the new CISO office must have support from UNLV's executive leadership team, be housed outside of central IT, and have adequate resources to meet the recommended responsibilities. Additionally, the work of a CISO office needs to be collaborative and provide visibility into the activities designed to strengthen security at UNLV.

3. Form a Cyber Security Team. Establishing a cross-organizational Cyber Security Team will enable the university to design and deliver comprehensive security programs that protect the entire campus. The Cyber Security Team, comprised of information and technology specialists from across the campus, will:

- Work through the Technology Advisory Committee (TAC) and Technology Review Board (TRB) to ensure alignment with other IT initiatives
- Adopt an industry standard security framework to guide security initiatives on campus
- Create and foster a campus-wide approach to IT security
- Maximize UNLV's ability to address compliance requirements and changing security risks
- Promote awareness on IT security issues, compliance changes, threat mitigation, and individual responsibility for helping ensure a safe IT environment
- Recommend to the TRB policies, procedures, and technical measures that protect the IT environment
- Develop and maintain a Security Liaison program
- Recommend security measures for emerging technologies (e.g., mobile devices, cloud services)

More information about the Cyber Security Team, including charges, can be found in Appendix 8A.

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4. Sustain and extend the work of the NSHE Security Audit. Since July 2011, the security audit has been the driver for security improvements at UNLV. These audit remediations have focused on protecting devices (i.e., networks, computers) and systems (e.g., identity management, file storage solutions) with some attention to policy development and security awareness. Additional layers of security are needed to protect data residing on the devices and in information systems. The following protections should be implemented:

- Data Encryption - for protecting sensitive data in storage and in transit
- Data Loss Prevention - for detecting sensitive data that may leave the campus unencrypted
- Data Backup Solutions – for recovering critical data after an equipment failure or theft

A comprehensive data encryption solution will secure the data in the event that border protection (e.g., firewalls) and/or device protection (e.g., servers, computers) are penetrated and will bring UNLV into compliance with state regulations. Once the university has an encryption solution, data loss protection solutions are needed to prevent unencrypted sensitive data from leaving the campus. A desktop backup solution will provide business continuity for employees whose documents may be irretrievable after a computer malfunction or theft.

5. Enhance education, training, and awareness. Providing better protection for the devices and the data on those devices will significantly improve information security at UNLV. However, individuals who access that data must also be aware of the important role they have in the protection of university data assets. When individuals share their passwords, leave their computers on and unattended for long periods of time, or move sensitive data to unencrypted flash drives, campus data is at risk. UNLV's security strategy includes ongoing comprehensive education, training, and awareness programs that emphasize collective responsibility for IT security. The initial rollout of UNLV's Smart Computing awareness campaign began in 2015. The ongoing effort should be assessed and the results used to inform the development of additional awareness activities. To facilitate this effort, security awareness and training for employees and students is included in the responsibilities of the CISO and as a charge for the Cyber Security Team.

6. Establish and maintain an ongoing risk assessment program. Comprehensive enterprise security solutions are expensive, resource intensive, and can take 18 to 24 months to implement. To help determine when new solutions should be added to UNLV's security strategy, the university is developing a risk management plan based on industry standards and best practices. The risk management plan will include:

- A comprehensive data classification effort and associated risk mitigation plans for sensitive data
- Assistance for investigators in identifying and mitigating risk associated with collecting, storing, and sharing research data
- Assistance with designing and auditing data streams between enterprise information systems and other campus applications
- Adoption of comprehensive data retention schedules
- Proactive self-assessment

The data classification effort - To manage risks effectively, the university must:

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1. Identify all potentially vulnerable information system resources and data
2. Determine the risk tolerance and impact of a compromise for the systems and data
3. Define appropriate controls to mitigate the risks for those systems and data deemed most critical

These efforts need to be done in concert with the campus data management efforts (see Initiative 13). Existing data elements in the campus data dictionary need to be reviewed and assigned a security classification to inform users about the security measures required when using the data. Procedures for adding new data elements to the dictionary must include security classification reviews and, if warranted, risk management plans.

Special needs for research data – As Top Tier initiatives are realized, new security measures are needed to collect, retain, protect, and disseminate research data. Data management plans for various granting agencies are now mandated. The plans will need to be audited for their effectiveness. The data being collected as part of research projects involving health and/or social issues are of particular concern. Investigators may require assistance from information security professionals to identify the risks. The newly proposed Research Technology Group (see Initiative 1) can work with the CISO office and/or the Cyber Security Team to ensure investigators have the resources needed to keep their research data both safe and accessible.

Auditing data streams - The campus risk assessment plan should include periodic audits of the data streams that move data from enterprise systems (e.g., student, human resources, and finance) to supplemental systems. For example, many of the new Retention, Progression, and Completion efforts involve moving information currently residing in the student information system and the learning management system to new data analytic applications (e.g., EAB Student Success Collaboration). Much of the data is FERPA-protected. The protections provided by the originating systems must be preserved as the data are moved, transformed, and stored. Periodic audits are needed to ensure ongoing compliance. An increase in data movement and transformation activities is also expected with the introduction of new human resources and finance information systems and will require similar periodic audits (see Initiative 9).

Data retention - One sure way to protect sensitive data is to delete it when it is no longer required. While some data must be kept indefinitely (e.g., transcript data), most can be deleted after an agreed-upon retention period. NSHE has recently established data retention periods. UNLV must develop retention schedules and procedures to ensure records are in compliance with the new NSHE regulations. The CISO and/or the Cyber Security Team should help evaluate automated options for securely eradicating expired data. The adoption of data retention schedules is also critical for the implementation of document management solutions (see Initiative 12) and data management and reporting efforts (see Initiative 13).

Proactive self-assessment - Although the university is subject to external audit, UNLV's should supplement these audits with proactive security monitoring. The CISO office will be responsible for conducting periodic internal audits of the information systems containing data deemed to be the most sensitive. Those responsibilities include: identifying data security weaknesses; evaluating and prioritizing the associated risks; and creating teams to implement effective risk mitigation solutions.

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Initiative Owner	Chief Information Officer
Consultative Role	Chief Information Security Officer, Technology Advisory Committee, Technology Review Board, Cyber Security Team
Budget Estimate	
<p>The annual salary for a CISO position at a large research university is estimated at \$110,000 to \$140,000 plus benefits.</p> <p>New staff resources (2 FTE within OIT) will be needed to implement and support the three major security initiatives planned for the next three to four years (i.e., data encryption, data loss protection, desktop backup). The salary range for each position is approximately \$70,000 plus benefits.</p> <p>The three staff resources above will also be needed to implement and maintain data classification efforts, support research data management plans, conduct risk assessments, and help develop and implement risk mitigation plans.</p> <p>Data encryption and data loss protection solutions costs vary widely and depend on how well they integrate with other campus solutions. Data encryption solutions are approximately \$175,000. Data loss prevention solutions are approximately \$250,000. Both have annual maintenance costs of about 5%.</p> <p>Estimated costs for a limited rollout of computer backup services are \$52,000 one-time funds and \$21,000 annually. The full cost will be determined once a pilot program is complete.</p> <p>New Positions: 3 FTE; Total One-time and Recurring Costs FY16-FY19: \$ 1,011,081</p>	
Action Items to Implement Initiative	
<ol style="list-style-type: none"> 1. Hire a Chief Information Security Officer. 2. Create a UNLV Cyber Security Team. 3. Establish annual goals to achieve Cyber Security Team recommendations. 4. Establish a Data Security & Integrity vision. 5. Adopt an industry standard security framework. 6. Implement and regularly assess a comprehensive security strategy. 7. Annually review and audit IT security policies and procedures. 8. Annually recommend revisions to IT security education, training, and awareness programs. 9. Implement data encryption, data loss prevention, and desktop backup solutions. 10. Adopt a tiered classification system for UNLV data. 11. Establish and annually update UNLV's risk assessment program. 	
Anticipated Benefits	
<ul style="list-style-type: none"> • Improved security of UNLV IT assets. • Security measures are balanced with access and usability needs. • Fewer disruptions to university business as security breaches decrease. • Reduced risk to UNLV's reputation. 	

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<ul style="list-style-type: none"> Increased document and data protection provided by computer backups. Improved risk management. Increased support for unique research data security needs. UNLV faculty and staff are better prepared to meet their obligation for protecting university assets.
Measures of Success
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Increased recognition of the role of the Chief Information Security Officer. <input checked="" type="checkbox"/> UNLV's Cyber Security Team progress on meeting its charges. <input checked="" type="checkbox"/> Improved ratio of information security staff to institutional FTE count. <input checked="" type="checkbox"/> Reduction in the time to resolve data security incidents. <input checked="" type="checkbox"/> Activities to strengthen federal, state, and NSHE compliance. <input checked="" type="checkbox"/> Reduction in IT security risks. <input checked="" type="checkbox"/> Effectiveness of security awareness training. <input checked="" type="checkbox"/> Decreased incidents of lost documents and data due to inadequate backup. <input checked="" type="checkbox"/> Increased efficiency in assessing risk.
Contextual Information
<p>Peer Institution Research. At George Mason University, the Department of ITU Security and Project Management houses a Director of IT Security (CISO). The Director has five positions under the CISO and reports to the Project Management Office. If necessary, the CISO addresses the Executive Council on IT security issues. In addition, a Security Liaison is required in each department. The liaisons, comprised of full-time IT members and administrators, meet at least annually.</p> <p>At Arizona State University (ASU), the CISO is responsible for the overall university-wide information security program including identity and access management as well as security policy and oversight. The program elements include: policy and governance, continuous improvement, education and outreach, and assessments to inform the next set of initiatives. The CISO reports directly to the CIO. ASU also reported that the university takes a risk-based approach to its information security program. ASU balances the availability and access requirements of the university with the need to properly secure its assets and data.</p> <p>Other relevant research. Based on 2012 data provided by the EDUCAUSE Core Data survey (January 2013), doctoral institutions average one information security staff per 4,553 institutional FTEs. UNLV had 21,910 institutional FTEs, which would equate to 4.8 information security staff. However, the university currently has only three full-time security staff (two in OIT and one in Research).</p> <p>At the University of Colorado Boulder, an IT security assessment was linked to the annual hardware inventory. The key elements of this effort include:</p> <ul style="list-style-type: none"> Gaining executive support to conduct institutional audit of all hardware to ensure security

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compliance

- Providing deans and business officers with a standard inventory template, scanning tools to locate computers and servers storing private data, and local IT support to complete the audit
- A goal of achieving 90% inventory compliance by the fourth year of the effort

9. iNtegrate 2

Implement new human resources and finance systems to reduce labor-intensive manual processes, decrease duplication of effort, improve tracking, and increase self-service options. The new systems are designed to integrate well with existing applications, improve data integrity, enhance security, and provide better access to information for decision-making and reporting.

The Nevada System of Higher Education (NSHE) is leading a system-wide initiative to replace existing shared human resources and finance systems with a newer, more powerful suite of enterprise applications. Known as iNtegrate 2, the project is expected to transform administrative activities by automating, streamlining, and standardizing business processes in human resources and financial management. The new integrated systems will also replace several stand-alone campus applications currently used to help meet human resources and financial information management needs. Implementation of the new systems will address many of the concerns students, faculty, and staff voiced regarding the challenges experienced in completing university business functions.

NSHE collaboration. In preparation for the selection of the new systems, staff from all NSHE institutions worked with consulting partners to determine the structure for a new Chart of Accounts and to make recommendations regarding possible business process changes. The details are available at <http://www.integrate2.nevada.edu>.

In February 2015, Workday, a software-as-a-service solution, was chosen for the new human resources and finance applications. Sierra-Cedar was chosen as the implementation partner. An aggressive implementation schedule has both the human resources system and the financial system going live for all NSHE institutions in 2017.

A project team comprised of representatives from each institution is helping lead the system-wide effort. UNLV has established a campus steering committee to direct the university effort. Additional campus working groups have been formed to assist with the implementation. Details are available at <http://www.unlv.edu/workday>.

Benefits and initial impact. Once complete, this multi-year effort is expected to: streamline administrative processes; reduce duplication of effort; eliminate many paper-based forms; support the automated transfer of transaction data for quicker processing; allow electronic approval; and provide transparency into complex administrative processes. The iNtegrate 2 initiative will impact every department/unit at UNLV and will represent a significant change in how human resources and finance activities are conducted on campus and across the system.

The project focuses on business process changes necessary to take advantage of the functionality in the new systems. Table 9-1 lists the functional areas undergoing transformation.

Table 9-1: Major Functional Systems in iNtegrate 2

Human Resources	Finance
Recruitment	General Accounting
Employee Onboarding	General Ledger

9. iNtegrate 2

Human Resources	Finance
Benefits Administration	Procurement and Contracts
Position Administration	Accounts Payable
Performance Appraisals	Accounts Receivable
Personnel Administration	Payroll
Time and Attendance	Travel Accounting
Employee Self-Service	Budget Development and Management
Employee Relations Management	Grants and Contracts – Post Award
Employee Training	Asset Management
Business Intelligence and Reporting	Business Intelligence and Reporting

Interdependencies. The iNtegrate 2 project will both impact and be impacted by several of the initiatives contained in the UNLV IT Master Plan. The initiatives and the interdependencies are shown in Table 9-2.

Table 9-2: IT Master Plan and iNtegrate 2 Initiative Interdependencies

#	Initiative	Initiative Interdependencies
4	IT Projects	<ul style="list-style-type: none"> iNtegrate 2 will generate several new project requests and serve as a foundation for many new technology projects. Project governance teams will need to develop a prioritization process for new interfaces to the enterprise systems for all existing human resources and finance applications that will not be replaced by Workday and all others that depend on data from the new applications. Interoperability with Workday will need to be considered when new technology purchases and projects are proposed. Project prioritization processes will need to account for staff resources diverted to Workday projects and adjust other approvals and timelines accordingly. Some projects will be delivered more quickly after Workday implementation and others may no longer be needed.
8	Information Security	<ul style="list-style-type: none"> New security profiles for allowing access to data in Workday will need to be created to ensure audit compliance. All current application security profiles used for accessing human resources and financial systems will need to be re-established.
10	Identity Management and Single Sign-On	<ul style="list-style-type: none"> The human resources systems will be the definitive source for employee data necessary to populate the identity management system and update employee roles and responsibilities needed to provide appropriate access to other systems.

9. iNtegrate 2

		<ul style="list-style-type: none"> Identity management initiatives using complex human resources information will be easier to implement once Workday implementation is complete.
12	Enterprise-wide Document Management	<ul style="list-style-type: none"> The new enterprise-wide document imaging solution will be integrated with the new human resources and finance systems, where appropriate. The document imaging solution will depend on the identity management and Workday systems for workflow routing. Workflows for the business processes that depend on information contained in more than one of the major campus enterprise systems will need to be revised, developed, or eliminated.
13	Leveraging Institutional Data Management	<ul style="list-style-type: none"> Workday will serve as the definitive source for many campus core data elements. The new Workday applications will increase the accuracy and consistency of data, thereby facilitating improvements to data management and reporting. New data definitions will be required for the new applications. New interfaces with the current data warehouse will need to be developed. New reports to meet current and new reporting requirements will need to be created.

Integration with existing UNLV systems. The new human resources and finance systems will need to share data, workflow, document management, and reporting with the suite of applications that comprise the student information system (e.g., PeopleSoft Campus Solutions, TouchNet). Together, the three systems will create and maintain the majority of the campus information. Seamless integration between the three systems is imperative for improving productivity and analyzing the information needed to make complex decisions about the effectiveness of existing programs and new strategic initiatives.

Additionally, UNLV currently has over 100 campus applications used to help meet human resources and financial information management needs. Some existing applications will be replaced by the functionality of the new Workday applications. However, other applications will still be needed and will require new or upgraded interfaces to provide and/or receive data from the new human resources and finance systems.

Impact on campus resources. The iNtegrate 2 project budget includes resources to assist with many of the implementation and ongoing maintenance activities. However, the resources will not be sufficient to complete all the required work without using existing functional and technical staff currently working on other activities. Completion of some of the initiatives in the IT Master Plan may be delayed to accommodate the Workday implementation timeline.

Long-term benefits. Once completed, the iNtegrate 2 implementation will serve as the foundation upon which many other initiatives in the IT Master Plan. Complex business processing, workflow, and reporting improvements provided by Workday will help the campus make more informed decisions about the cost effectiveness of new retention strategies, the contribution of interdisciplinary research projects to the campus indirect cost recovery funds, and other items that indicate progress on the strategic objectives of the university.

9. iNtegrate 2	
Initiative Owner	Senior Vice President for Finance and Business
Consultative Role	Finance and Business Staff, NSHE System Computing Services (SCS), Enrollment and Student Services, Office of Information Technology
Budget Estimate	
<p>The campus budget for the initial implementation of iNtegrate 2 is approximately \$6 million and includes 10 additional FTE for a three to four-year period. These implementation costs are not included in the Plan. The Plan budget includes two positions required for ongoing development of interfaces. The salary range for each position is approximately \$65,000 plus benefits.</p> <p>New Positions: 2 FTE; Total One-time and Recurring Costs FY16-FY19: \$440,149</p>	
Action Items to Implement Initiative	
<ol style="list-style-type: none"> 1. Implement Workday. 2. Help design and test the new Workday applications. 3. Develop interfaces between Workday and existing campus systems. 4. Provide technical staff with Workday training. 5. Implement a process to prioritize alternatives for functionality unavailable in Workday. 	
Anticipated Benefits	
<ul style="list-style-type: none"> • Reduction in the time needed to process day-to-day transactions, as automated processes replace paper-based forms. • Improved satisfaction with the campus administrative systems. • Enhanced understanding and standardization of university administrative processes. • Access to integrated data improves university strategic planning and reporting. • Automated, transparent processing of transactions and associated electronic approval supports responsive customer service. • Individuals can more easily manage their employment data with improved self-service functionality. 	
Measures of Success	
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Workday functionality issues are identified in testing. <input checked="" type="checkbox"/> UNLV community is well-informed about the transition to Workday. <input checked="" type="checkbox"/> Employee Workday training is effective. <input checked="" type="checkbox"/> Solutions are identified to address gaps in Workday functionality. <input checked="" type="checkbox"/> New approved interfaces completed on time. <input checked="" type="checkbox"/> Workday enhancements are aligned with university strategic priorities. 	

9. iNtegrate 2

- ☒ Improved satisfaction with business process, business intelligence, and reporting.

Contextual Information

In 2009, Collegiate Project Services completed a study of 12 higher education institutions planning to implement new ERP solutions. The purpose of the study was to identify the top ten most often cited benefits associated with moving to new ERP solutions. The table below provides a ranked list of the benefits.

Top 10 Benefits		
Rank	Benefit	% of Institutions Reporting this as a Top 10 Benefit
1	Enhanced Technology	91%
2	Efficiency	91%
3	Integrated Information	66%
4	Reporting	66%
5	User friendly	66%
6	Access to Data	50%
7	Customer Service	50%
8	Functionality	41%
9	Communication	25%
10	Security	25%

More details regarding each of the ten benefits are available in the full article:

http://www.collegiateproject.com/articles/ERP_Benefits.pdf

10. Identity Management and Single Sign-On

Establish an identity management program to improve the efficiency of user account administration, increase information security, improve collaboration, and simplify access to resources and data.

Identity management generally refers to the procedures involved in establishing a person's identity and providing access to information technology assets (e.g., data, network resources, and other restricted hardware and software) on the basis of that identity. All constituents of UNLV have multiple attributes that define the different roles they have with the university. For example, a single individual has a name, a campus address, employment dates and degrees; the individual may also be a faculty member, a tenured faculty member, a member of the School of Architecture, a member of the College of Fine Arts, an academic advisor, a primary investigator on a federal grant, a supervisor of other employees, etc. These roles are used to determine which resources a person can access, to target information to members of specific groups, and to facilitate complex automated services.

The current environment. The university currently uses several different approaches to manage identities and provide access to campus resources, thereby creating an IT environment where:

- Multiple systems independently manage identities
- Identity information is stored in multiple places
- Individuals have multiple identities, sometimes even within the same system

This fragmented approach to identity management poses several challenges:

- Separate identities create a variety of security risks
- Accessing necessary IT services requires multiple logins
- Significant time and effort is required to connect information in different systems

The current systems also lack the automation necessary to keep identity information consistent across campus systems. For more information about the identity management environment at UNLV, including examples involving university applications, see Appendix 10A.

Establishing an identity management program. To manage identities and access, UNLV must establish an identity management program. The program requires the development of new processes and the implementation of several new technologies to create and sustain identity and access privileges until they are no longer needed.

UNLV has recently procured an enterprise-level identity management suite and is in the process of initial deployment. The implementation will occur in phases. Phase 1, to be completed by June 2016, includes the following features:

- A single ID and password for multiple campus systems
- Establishment of general user groups (e.g., academic staff, faculty, administrative staff, students)
- Federated identity functionality to provide access to national research and library resources

Subsequent phases of the identity management program include further development of user groups to support a more granular level of role-based identity management. See Appendix 10B for a three-year

10. Identity Management and Single Sign-On

identity management implementation roadmap.

Identity management and iNtegrate 2. NSHE's iNtegrate 2 initiative will have significant impact on UNLV's identity management program (see Initiative 9). The human resources module of the new iNtegrate 2 system (i.e., human capital management in Workday) will be the authoritative source of data for many of the attributes that identify university employees. The identity management roadmap reflects these dependencies by deploying features dependent on robust employee data to later phases in the implementation. These interdependencies will need to be managed as the iNtegrate 2 initiative develops.

Supporting Top Tier research and academic initiatives. Establishing an identity management system at UNLV will make it possible to provide resources to academics, researchers, and other university personnel that will enhance their productivity and ability to collaborate with others from around the globe. The new system will also provide direct support for ongoing academic and research goals established to achieve Top Tier status. For example, to increase collaborative research with other U.S. higher education institutions, UNLV has joined the InCommon Federation, an organization providing services that allow its members to share a common framework for trusted access to online resources in support of research and education. Not having to populate users and passwords for every system saves considerable expense and time in inter-institutional collaborations. Through InCommon, users are provided single sign-on convenience and privacy protection. One hundred and five of the 108 Carnegie Research Very High institutions, as well as many non-profit grant funding agencies, are members of the InCommon Federation.

UNLV's membership in the InCommon Federation made it possible for the university to join the HathiTrust, a partnership between academic and research institutions offering a collection of millions of titles digitized from libraries around the world. Since July 2015, students and faculty can now access the collective using InCommon identity management services. The National Science Foundation (NSF) also permits researchers to log in to the NSF research.gov database using InCommon identities. Additional information about the resources available to the UNLV community through the InCommon Federation can be found at: <https://oit.unlv.edu/incommon/information>.

Single sign-on. Single sign-on is the most commonly cited new service requested by students, faculty, and staff. The comprehensive identity management system being implemented will facilitate a single sign-on environment where each user's unique ID and password will provide access to multiple applications based on the user's profile. Reducing the number of logins and passwords will:

- Increase student and employee satisfaction with technology services
- Strengthen the university's security posture
- Ease the introduction of new applications (e.g., iNtegrate 2, document management)
- Better support the increasing presence of mobile devices on campus

Single sign-on will also ease the administrative burden for technology staff tasked with managing user access on an application-by-application basis throughout the user's association with the university. From a security perspective, managing identities centrally strengthens the ability to provide access to multiple applications simultaneously (e.g., enforce strong password requirements) and reduces the risk

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of unauthorized access (e.g., failing to remove an employee from every campus application upon separation from the university).

Account policies. The establishment of a successful identity management program requires the development of policies that define how user accounts are created, maintained, modified, and terminated. Additionally, the university will need to create a group identity for individuals with similar functions (e.g., administrative assistants, data analysts, faculty) and assign access privileges to enterprise systems (e.g., WebCampus, MyUNLV) based on group membership. Defining these groups and privileges requires collaboration among multiple departments/units as well as distributed and centralized technical units.

In addition to these groups and privileges, the university will need to establish policies and procedures for requesting, approving, modifying, and terminating user access, as well as for regularly auditing group membership for the appropriateness of access privileges. Throughout the implementation of this initiative, the Technology Advisory Committee (TAC) will be responsible for ensuring that any barriers to progress are identified and resolved in a timely manner (see Initiative 1).

Relationship to data management. Determinations about what access is appropriate and what attributes constitute a defined role on campus are required to implement components of the identity management system. Decisions about who has access to UNLV data and the extent of that access is the purview of campus data stewards. Consequently, progress on the provisions of role-based access to campus systems will require the assistance of those involved in the campus data governance effort (see Initiative 13).

Initiative Owner	Chief Information Officer
Consultative Role	Technology Advisory Committee, OIT, Data Governance Groups
Budget Estimate	
Existing UNLV resources have been identified for the first phase of the initiative. An additional \$200,000 will be required to complete the implementation. After the implementation is completed, one new position (approximately \$85,000 plus benefits) will be required to maintain and expand the system.	
Action Items to Implement Initiative	
<ol style="list-style-type: none"> 1. Complete the initial Identity Management implementation. 2. Implement Identity Management Phase 2 – See Appendix 10B for details. 3. Implement Identity Management Phase 3 – See Appendix 10B for details. 4. Provide single sign-on to UNLV applications where appropriate. 5. Develop a process for determining the authoritative source for data used to populate the identity management system. 6. Annually assess procedures that define how users within the identity management system are managed (e.g., added, maintained, modified, terminated). 7. Establish procedures to add groups to the identity management system and define access privileges. 	

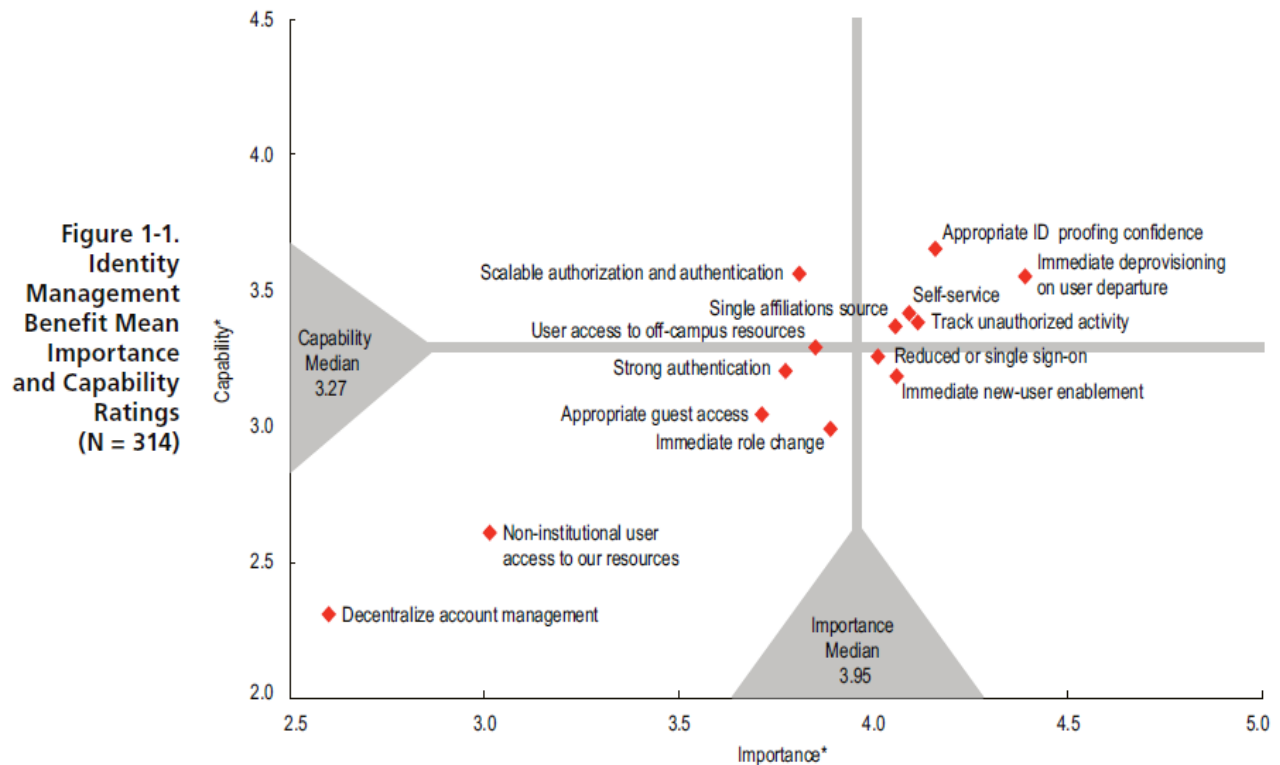
10. Identity Management and Single Sign-On
8. Annually audit group membership for accuracy and appropriateness of access privileges.
Anticipated Benefits
<ul style="list-style-type: none"> • Fewer logins needed to access university resources. • Data security and appropriate access to university systems and resources are easier to manage. • Simplifies access to research resources and library collections at other higher education institutions. • Facilitates collaboration with research colleagues at other institutions. • Improved security and privacy for the UNLV community. • Expedited implementation of new systems. • Easier implementation of some cloud-based and external services.
Measures of Success
<ul style="list-style-type: none"> ☑ Number of UNLV systems utilizing identity management. ☑ Additional services available through InCommon credentials. ☑ Number of UNLV systems available through single-sign on. ☑ Satisfaction with account management services. ☑ Decrease in number and criticality of audit findings regarding access privileges.
Contextual Information
<p>Other relevant research. Figure 10-1 on the next page provides a summary of the relationship between the identity management capabilities of several higher education institutions and the importance of the benefits realized through identity management programs. The upper-right quadrant includes benefits that are most important for those institutions that had the highest capability ratings. To provide more support for the academic and research needs of a high research activity institution, UNLV needs to strive to provide identity management services found in the upper-right quadrant such as ID proofing confidence (trust factors to become part of research collaboratives, etc.). To better serve users, improve security, and address audit findings, UNLV needs to provide services such as reduced or single sign-on, immediate new-user enablement, and immediate deprovisioning on user departure.</p>

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Figure 10-1 Identity Management Benefits

Identity Management in Higher Education, 2011

ECAR Research Study 1, 2011



* Scale: 1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high

The data is based on research released in 2011. Source:
<http://net.educause.edu/ir/library/pdf/ERS1101/ERS1101W.pdf> (p. 12)

11. Mobility

Meet the growing expectations for mobile access to information and services in a manner that is expeditious, secure, sustainable, and focused on improving university services.

UNLV has substantial work to do to deliver mobile services that are capable of meeting the increasing expectations of university stakeholders and are competitive with comparable institutions. For UNLV to enter the mobile arena in a significant way, the university must commit to developing all aspects of an effective mobile environment. That commitment includes:

- Infrastructure for mobile application development, delivery, support, and related services
- Mobile access to campus applications
- Support for mobile devices both on and off campus

Despite the considerable urgency to provide mobile applications for all university services and extensive wireless coverage, UNLV must develop a mobile environment that builds in security, sustainability, and the capacity for innovation. Instead of attempting to quickly deliver the mobile support currently offered by other institutions, UNLV is well situated to adopt a strategic approach to deliver truly robust mobile services.

Implementing a mobile strategy. A successful enterprise mobile environment needs at its foundation, a well-developed, outcomes-based strategy. The strategy must define how UNLV will:

- Fund mobile application development, maintenance, and innovation
- Provide mobile access to institutional information wherever possible
- Develop a robust mobile infrastructure including related policies and procedures
- Institute a mobile application development framework
- Clearly articulate security requirements for mobile environments
- Adopt a mobile-first policy for application acquisition and development
- Implement a well-defined and inclusive mobile application project prioritization process
- Add mobile options for existing campus applications
- Enhance the UNLV Mobile application
- Support the innovative use of mobile devices in achieving learning and scholarly objectives
- Incentivize innovative mobile application development by and for students, faculty, and staff

Successful implementation of the mobile strategy requires broad participation from multiple campus units. Consequently, it is recommended that the Technology Advisory Committee (TAC) work with the Technology Review Board (TRB) to develop and oversee implementation of the mobile strategy. The group initially formed to implement the UNLV Mobile application could be utilized to assist with the effort.

Mobile application development. Mobile application development is a component of the broader distributed application development environment at UNLV. The units engaged in application development must be included in transitioning the campus to a mobile-first acquisition and development environment. An inclusive approach must:

- Take into consideration the highly distributed nature of application development at UNLV
- Provide a flexible application development framework

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- Facilitate coordination of existing resources
- Organize training and professional development opportunities for those seeking to add mobile application development to their skillset
- Establish standards for the creation of enterprise mobile applications
- Provide access to mobile application test and production environments
- Ensure adherence to information security requirements unique to mobile application development

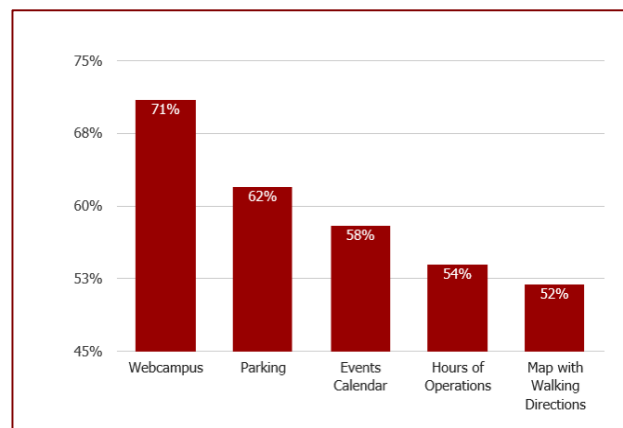
The mobility-first transformation requires a minimum of three full-time staff to:

- Enhance UNLV Mobile
- Support webpage mobility efforts
- Facilitate more rapid new application development
- Support innovation
- Assist students and faculty in creating mobile applications

Mobile access to university resources. Discussions with students, faculty, and staff indicate that, whenever possible, campus information should be accessible and commonly used applications should be available on mobile devices. As a first step, the Web Communications Office, the unit that manages more than 90% of the university's top-level websites, redesigned the sites to be responsive (i.e., adapt to different mobile device screen sizes). In addition to delivering responsive web pages, UNLV is also working on delivering mobile applications for some services. UNLV has begun to address these needs one service at a time. See Appendix 11A for a list of currently available UNLV mobile applications.

Recently, as part of a class project, a group of graduate Management Information Systems students conducted a series of assessments to help determine what new functionality should be added to the UNLV Mobile application. Results are shown below:

Figure 11-1: New Functionality for the UNLV Mobile Application



The most surprising finding was that WebCampus and a Map with Walking Directions were on the list. The university provides a WebCampus mobile application, though it is not linked to UNLV Mobile.

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Further, UNLV Mobile already has a map with walking directions. In addition to adding new functionality to the application, UNLV needs to focus on a marketing campaign regarding the current application. The results of the class project will be used to continue to enhance the UNLV Mobile app until such time as the new prioritization process called for in the mobile strategy is implemented.

In the absence of that prioritization process, existing resources will continue to be allocated and applications built or acquired to meet a particular need of a particular unit. Individual units have done their best to keep the applications current, add new functionality, and provide support. However, there is duplication of effort, no economy of scale and no clear support model. As the results of the student project indicate, a need for more communication about what current mobile application functionality is already available at UNLV.

Open data initiatives. One method to increase the development of mobile applications that utilize publicly available university data is to follow the example of the federal government's open data initiatives. The government's Digital Initiative has a goal of making public data more accessible by providing the information (e.g., a web application programming interface and metadata tags) that allows individuals, groups, and businesses to create their own mobile applications using federal data that is not privacy protected: (<http://www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government.html>).

The federal government has augmented the open data portion of its digital strategy by:

- Building an entire infrastructure of inter-agency shared resources to facilitate mobile development
- Facilitating collaboration and communication among the growing community of individuals interested in improving digital access to federal information
- Leveraging grassroots development through open challenge competitions that offer prizes and/or compelling appeals to civic-minded innovators to develop innovative solutions
- Crowdsourcing testing of mobile apps and resources

Although grassroots initiatives similar to those described above would remove some of the application development costs from the university, considerable resources and planning are required to evaluate the sensitivity of data, make the information available in a manner that is easily digestible, and ensure that the new development environments do not negatively impact the performance of university systems.

As UNLV's data management initiative progresses (see Initiative 13), some of these data definition and data management issues will be more easily addressed. However, the TRB and TAC will still need to clarify which applications the university has a commitment to maintain and support, whether developed in a public/private partnership with the university or independently.

Support for mobility initiatives. Mobile devices currently provide access to instruction in the field, curriculum delivery, learning assessments, data collection, field support in a variety of research settings, and access to UNLV resources. To better serve the campus community, the support services for both the most commonly used devices and the most widely adopted mobile applications need to be coordinated.

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Protecting the mobile environment. As UNLV determines the best way to support a growing number and variety of mobile devices and mobile applications, resources must be devoted to protecting the mobile environment. Many of the action items included in the Information Security initiative (see Initiative 8) will improve the security of the mobile environment (e.g., identity management, data encryption). However, additional measures must be taken to address the use of university-issued and personal mobile devices that access university information.

Device security is the most challenging. Security efforts must focus on managing access (e.g., requiring passwords for access to university data) and protecting the data stored on the devices (e.g., ability to lockdown access when university-owned devices are lost or stolen). Policies, procedures, and tools to protect the devices and the data they contain need to be developed in consultation with the Cyber Security Team (see Initiative 8).

Building security into the development and management of mobile applications combined with securing information at the application level will provide additional layers of protection. Mobile application development standards that include provisions for access to sensitive data will need to be developed and enforced. Additionally, incorporating the use of the Identity Management system (see Initiative 10) in provisioning mobile applications will help ensure that, when students or employees are no longer affiliated with the university, access to the applications is removed in a timely manner.

Expanding the wireless infrastructure. At the foundation of a successful mobility strategy is a robust wireless infrastructure. Broad coverage, adequate bandwidth, and seamless movement across coverage areas are critical to support the increasing number of mobile devices in use at UNLV (See Table 11-1).

Table 11-1: Changes in Network Connectivity from 2012 to 2015

Network Connections	October 2012	October 2015	% Change
Unique wireless connections per month	36,674	63,959	74.4%
Unique wired connections per month	14,341	15,412	7.4%
Total connections	51,015	79,371	55.6%
Network Authentications*	October 2012	October 2015	% Change
Authentications per day	320,000	618,077	93.1%

In Fall 2015, over 80% of the devices connected to the network did so through the campus wireless network. The activity on those devices consumed approximately 65% of the campus Internet traffic. Additionally, the bandwidth consumed by wireless connectivity grows about 20% annually.

Approximately 75% of the indoor spaces at UNLV are covered by the campus wireless system. However, most of the coverage was not designed for the current load and does not work under heavy usage. An additional 5% of the indoor spaces have wireless coverage provided by devices installed and supported by the occupants of those spaces. The remaining 20% of the indoor spaces have little or no coverage. Additionally, only about 1% of the outdoor spaces on the campus are covered. For a map of current UNLV wireless coverage see Appendix 11B.

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UNLV's project-by-project approach to extend wireless capacity is not efficient or cost effective. It is recommended that UNLV develop a wireless overlay plan that can be used to:

- Determine more precisely what is needed to complete the campus coverage
- Develop a phased approach to achieving maximum capacity
- Ensure there is adequate bandwidth and seamless movement around the entire campus
- Provide detailed cost estimates for each phase of the overall plan

In addition to expanding and enhancing the wireless capacity at UNLV, the wireless authentication system needs to be replaced. The current solution was designed when wireless was first introduced to the campus in Fall 2004. The solution has served the university well but will not accommodate the exponential growth in demand for wireless access. A comprehensive wireless authentication solution that integrates with the university's Identity Management system must be purchased (see Initiative 10).

Finally, as the wireless infrastructure matures, it is vital that the architects of that infrastructure continue to add security features that help protect university resources.

Mobility and unified communications. As the campus wireless network is extended, efforts are also underway to enhance cellular phone coverage and related services on campus. Additionally, there are discussions about providing comprehensive unified communications to the campus (e.g., the ability to have email converted into voice messages and delivered to a person's phone or phone messages converted to text and sent to email). As those discussions evolve, additional coordination between data and phone services on campus will be required (see Initiative 14 for more details).

Initiative Owner	Chief Information Officer
Consultative Role	Technology Advisory Committee, Technology Review Board

Budget Estimate

A minimum of three full-time employees will be needed to meet the outcomes expected from the mobile strategy. Estimated costs, not including benefits, are \$200,000 annually. Programs to incentivize innovative mobile application development by and for students and faculty require \$50,000 annually.

Costs for completing the wireless overlay at UNLV, by year, are estimated to be:

Year 1 - \$300,000 – authentication system replacement, site planning, replace aging access points

Year 2 - \$2,590,000 – extend coverage

Year 3 - \$6,774,091 – complete coverage

One additional staff member (approximately \$70,000 plus benefits) is needed to support the expanded wireless environment.

New Positions: 4 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$11,393,514

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Action Items to Implement Initiative
<ol style="list-style-type: none"> 1. Develop and implement a mobile strategy. 2. Secure ongoing staffing and infrastructure resources to implement the mobile strategy. 3. Implement a prioritization process for mobile application development and acquisition. 4. Coordinate support services for commonly used mobile devices and applications. 5. Increase the number of campus applications with mobile access. 6. Annually add new functionality to the UNLV Mobile application. 7. Update the IT Service Catalog (see Initiative 5) with information about mobile versions of campus applications. 8. Provide incentives for broad participation and innovation in the development of mobile applications. 9. Develop security standards for mobile application development at UNLV. 10. Replace the current wireless authentication solution. 11. Develop a wireless overlay plan to include overall costs and a phased approach for implementation. 12. Expand wireless access to cover all indoor and outdoor spaces on campus.
Anticipated Benefits
<ul style="list-style-type: none"> • Enhanced communication with students in support of retention efforts and better customer service. • Increased mobile access to UNLV information and services. • Well-marketed, accessible, and supported UNLV mobile applications. • Secure mobile access to university resources. • Seamless indoor and outdoor wireless coverage. • Mobile innovation that fosters student success. • Enhances UNLV's reputation as a vibrant institution.
Measures of Success
<ul style="list-style-type: none"> ☑ Increase in the number of university applications with mobile options. ☑ New functionality added to the UNLV Mobile application. ☑ Improved customer feedback on usability and functionality of mobile services. ☑ Mobile policies and procedures are used to protect UNLV's brand and data. ☑ Favorable security audit findings regarding the mobile environment. ☑ Growth in the number of mobile applications developed with innovation funds. ☑ Reduction in IT Help Desk calls regarding wireless services issues.

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- ☒ Increased percentage of indoor and outdoor areas with adequate wireless coverage.

Contextual Information

Peer Institution Research. Arizona State University (ASU) has invested heavily in mobility. The institution provides mobile access to a diverse set of university resources (e.g., student information system, maps, directory, library, news, athletics, campus life, events and calendars, future students, colleges, and schools). ASU also builds device-agnostic applications to provide a wide range of device usage and functionality in a mobile environment. See <http://m.asu.edu> for more information.

At ASU, campus-wide wireless connectivity is estimated to be at or near 100%. Overall, the campus struggles more with capacity than coverage. The university continues to add capacity as needed. The effort is on-going as more wireless-capable devices are brought onto the network every day.

At the University of Oregon (UO), a master's student in the Applied Information Management program focused his thesis work on the pros and cons of developing an institution-wide Bring Your Own Device (BYOD) policy. The study identified factors for consideration when developing institution-wide strategies to address the use of personally owned mobile devices in higher education environments. Topics included: policy creation, data security, user education, and mobile learning. The document is a rich source for information to help guide both strategy and policy development and is available at: <https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/12254/Emery2012.pdf>

Other relevant research. Excerpts from a Campus Technology article entitled, “*Go Mobile or Kiss Future Students Goodbye*,” highlight the importance of mobility in a student’s decision about which college to attend. The article reports that:

- 70% of college-bound high school students look at college websites on mobile devices
- 43% of students use their mobile devices almost exclusively to go online
- 73% expressed interest in institutions that offer campus-specific mobile applications

The article also includes details about the mobile strategy and the benefits of its implementation at Indiana State University (ISU). The article reports that ISU:

- Has successfully moved mobile recruitment and admissions to the forefront
- Believes that giving prospective students the capability to consume key information about the university from any device, at any time, will create a positive brand experience
- Has a goal to make critical and top-level services accessible from a mobile device through either a mobile application or a mobile website
- Made mobile-first design a part of its strategy to better serve its customers

The complete article can be found at: <http://campustechnology.com/Articles/2013/09/12/Without-Mobile-First-Strategy-Kiss-Students-Goodbye.aspx?CTMOB&p=1>

SECTION 4 – INFORMATION SHARING AND COLLABORATION TOOLS

IT Master Plan initiatives in Section 4 focus on providing technologies that facilitate utilizing information to improve effectiveness, decision-making, communication and collaboration.

12. Enterprise-wide Document Management	Establish a university-wide approach to digital document storage, electronic workflow, records retention, and secure disposal of archives that will support the university's goal to increase administrative efficiency.
13. Leveraging Institutional Data Management	Build upon the institution's university-wide support model for improving access, utilization, and governance of data that recognizes the strategic value of using information as an institutional asset.
14. Communication and Collaboration Tools	Cultivate a more engaged, connected, and collaborative campus community through the use of state-of-the-art technologies.

12. Enterprise-wide Document Management

Establish a university-wide approach to digital document storage, electronic workflow, records retention, and secure disposal of archives that will support the university's goal to increase administrative efficiency.

UNLV is committed to developing services that assist members of the university in accomplishing their work easily, efficiently, and securely. However, a substantial number of business transactions are still done using paper forms and/or electronic documents routed via email. To increase administrative efficiency the university needs to implement enterprise-wide document imaging and electronic workflow solutions that enable staff to:

- Electronically capture and store paper documents in a secure and searchable system
- Increase utilization of electronic workflows and approval processes to complete business transactions
- Track where official documents are in the approval process
- Ascertain what version of documentation is current
- Utilize the information contained in electronically stored documents for current and unanticipated future reporting needs
- Meet security requirements for electronically routed information and any accompanying scanned documentation
- Comply with records retention requirements

The new enterprise-wide systems must also provide the functionality required to create electronic business transactions that integrate information and documents from multiple campus systems (e.g., MyUNLV, Workday, Digital Measures).

Document imaging. To meet existing needs, several divisions on campus have implemented document imaging solutions for local use (see Table 12-1).

Table 12-1: Current Document Imaging Solutions by Unit

Unit	Document Imaging Solution
Student Affairs - Enrollment & Student Services	Hershey Technologies
Executive Vice President & Provost - Educational Outreach - Summer Term	Image Now
Finance & Business - Controller	
Finance & Business - Human Resources	
Finance & Business - Delivery Services	
Student Affairs - Enrollment & Student Services	Internally Developed System
Advancement - UNLV Foundation	PaperSave
Executive Vice President & Provost - Graduate College	Retrieve X
Finance & Business - Planning & Construction	
Faculty Senate	
Research & Economic Development - Grants & Contracts	
Student Affairs - Enrollment & Student Services	

While these solutions have increased efficiency within individual areas, the university needs a unified document imaging solution to address business processes that cross units. Furthermore, many units

12. Enterprise-wide Document Management

have been hesitant to invest in document imaging until such time as a campus-wide solution is adopted.

Electronic workflow. The current use of electronic workflow systems across campus is difficult to ascertain. Some of the enterprise-level information systems (e.g., MyUNLV) include workflow functionality for transactional operations done within the system. The new Workday human resources and finance systems are also designed to automate many paper and email based business processes.

Typically the workflow functionality within major transactional systems does not extend to associated transactions that occur outside a particular system. To supplement existing workflows, some units utilize productivity tools (e.g., Adobe Acrobat) to create electronic forms that are then routed for approval via email. Various campus units use different tools and different processes for approval, increasing the learning curves and frustration levels for those engaged in administrative activities across the campus. Additionally, the workarounds used to route university data in the absence of an enterprise workflow solution challenge UNLV's ability to track and secure sensitive data.

The need for enterprise solutions. Support for the continued use of the eclectic mix of existing imaging and electronic workflow solutions is becoming increasingly difficult to maintain and licensing costs are inhibiting expansion. Further, having multiple document imaging and electronic workflow solutions limits the university's ability to leverage the efficiency that can be created by adopting campus-wide solutions.

The need is particularly acute in academic units where few commercial information systems designed to manage the workflow and approval processes unique to academic environments exist. Of particular importance are the business processes pertinent to achieving and tracking several of the Top Tier initiative action items, many of which reside in the Research, Scholarship, and Creativity and the Student Achievement goals. The action items call for a more efficient administrative environment where information can be captured, staged, warehoused, analyzed, reported, and not lost with each academic cycle. Specific examples are provided in Appendix 12A. Additionally, several units across campus have identified specific forms and processes that would benefit from implementation of the enterprise solutions.

Addressing the needs. The transition to enterprise imaging and electronic workflow systems will:

- Improve options for broader campus collaboration
- Increase productivity
- Provide more secure methods of storing protected data
- Address several audit and risk management concerns
- Comply with records retention schedules

The challenge lies in prioritizing all the document imaging and workflow needs and securing sufficient resources to meet them. The formation of a cross-organizational group to oversee the selection, implementation, and ongoing governance of enterprise imaging and workflow systems is recommended.

Responsibilities for the group include:

- Providing guidance on the selection and implementation of the new systems

12. Enterprise-wide Document Management

- Creating a timeframe for selection and initial implementation that considers the overlapping resources and full campus involvement required for the iNtegrate 2 Workday implementation
- Working with appropriate campus entities to address policy issues associated with document imaging and electronic work flow (e.g., data security, records retention, electronic signatures)
- Developing a staffing plan to support the new services taking into account resources needed for: application administration; project management; business process mapping; workflow programming; integration with campus systems; training; end-user support, etc.
- Determining costs and establishing a chargeback model for the services
- Aligning imaging and workflow projects
- Ensuring that data security requirements for the information stored in the imaging solution or moved through the workflow solution are met
- Sustaining and enhancing image and workflow services after completion of the initial implementation
- Addressing other imaging and workflow issues as they arise

To ensure successful campus-wide adoption, the implementation planning should include two major tracks:

1. Start-up assistance for units on campus who are new to document imaging and electronic workflow
2. Transition assistance for units who already utilize imaging and/or workflow solutions

Additionally, the new systems will be a rich source of new data that will need to be addressed as part of the institution's comprehensive data management efforts (see Initiative 13).

Related projects. The Nevada System of Higher Education (NSHE) has three current projects that will impact how the UNLV document imaging and electronic workflow solutions are implemented.

- *Records Retention* – The recently approved NSHE records retention schedule serves as a guide for how long records in the document imaging system must be kept.
- *Digital Signatures* – NSHE has instructed campuses to move to electronic approval processes wherever possible. Work is underway to determine when digital signatures for legally binding documents will be allowed and when traditional signatures will be required. A system-wide solution for digital signatures is being considered.
- *iNtegrate 2* – The replacement of the current human resources and financial management systems with Workday solutions is expected to improve the workflow for transactions completed within the new systems. However, transactions that involve capturing information from Workday and linking that information to data contained in other transactional systems (e.g., MyUNLV) will require an electronic workflow solution that resides outside of the transactional systems. Furthermore, the new Workday solution does not include robust document imaging functionality.

UNLV also has current applications that could take advantage of new enterprise document imaging and electronic workflow solutions. One example is Digital Measures where faculty activity is tracked. Having a repository of the documents associated with the activity would increase the usefulness of the tool.

IT Master Plan initiative interdependencies. It is recommended that the implementation of new

12. Enterprise-wide Document Management

document imaging and electronic workflow begin as soon as possible after the initial implementation of Workday is complete. Planning for the document imaging and electronic workflow solutions can and should occur during the initial Workday implementation. However, the roll-out of the new solutions will require many of the same campus resources as Workday and should be delayed until those resources are available.

Initiative Owner	Chief Information Officer
Consultative Role	<p>Designees appointed by Cabinet members from the following divisions:</p> <ul style="list-style-type: none"> Executive Vice President & Provost Finance & Business Research & Economic Development Student Affairs

Budget Estimate

Cost projections are dependent on a comprehensive procurement process to determine whether:

- Two complementary solutions for document imaging and electronic workflow are needed or whether the needs could be met in a single solution
- It is more cost effective to implement the software applications and provide associated storage on UNLV hosted hardware or to broker private or public cloud services
- Any of the current campus vendors can meet enterprise needs, allowing UNLV to leverage existing contracts

Consequently, the following cost estimates are for planning purposes only:

- One-time software, hardware or offsite hosting, license costs - \$300,000 to \$400,000
- Growth in usage new licenses, additional storage (about 25% of initial investment) - \$75,000 to \$100,000
- Annual maintenance (about 10% of initial investment) for hardware, software, licenses - \$50,000
- Three FTE (\$70,000 to \$80,000 plus benefits) to support the solution - \$300,000 to \$350,000

New Positions: 3 FTE; **Total One-time and Recurring Costs FY16-FY19:** \$1,428,159

Action Items to Implement Initiative

1. Create a cross-functional Document Management Steering Team.
2. Prioritize document management workflow project requests quarterly.
3. Align document imaging procedures with state and NSHE legal requirements for business processes (e.g., records retention, electronic signatures, data security).
4. Manage the interdependencies between the document management initiative and Workday.
5. Identify resources to support the document management implementation.
6. Develop interfaces between the document management solution and other major campus

12. Enterprise-wide Document Management	
systems.	
7. Annually audit alignment of new data generated by the document management solution with UNLV's data governance.	
Anticipated Benefits	
<ul style="list-style-type: none"> • Expedited business processes. • Reduction in lost documentation. • Reduced paper waste, errors, and time. • Improved ability to search for documents and respond to reporting requests. • Reduced physical storage. • Quicker approval processes. • Increased security for electronically routed data and documents. • Enhanced access to data for institutional decision-making. • Compliance with new records retention schedules. 	
Measures of Success	
<ul style="list-style-type: none"> ☑ Increase in enterprise business processes using the campus document management solution. ☑ Satisfaction with campus document management services. ☑ Increases in the number university documents available electronically. ☑ Increased visibility into the status of documents routed for approval. ☑ Alignment between document management priorities and university strategic priorities. ☑ Document management service requests completed within estimated time. 	

13. Leveraging Institutional Data Management

Build upon the institution's university-wide support model for improving access, utilization, and governance of data that recognizes the strategic value of using information as an institutional asset.

UNLV is at a critical juncture in determining how it will support data management and data governance activities. In Fall 2017 UNLV will be welcoming key new administrators in areas responsible for university data, as well as making substantial changes to some of the university's largest data systems. A Top Tier subgroup has been convened to develop new recommendations for innovative solutions to meet this growing need. In light of these developments, the Technology Advisory Committee has requested that initiative 13 be removed from the Plan and updated as recommendations are released.

Initiative Owner	
Consultative Role	
Budget Estimate	
Action Items to Implement Initiative	
Anticipated Benefits	
Measures of Success	
Contextual Information	

14. Communication and Collaboration Tools

Cultivate a more engaged, connected, and collaborative campus community through the use of state-of-the-art technologies.

Achieving Top Tier goals requires a rich, robust communication and collaboration environment. At the foundation of that is the development of technologies to foster communication, engagement, and collaboration. The innovative use of an evolving array of technologies will enable UNLV to:

- Enhance communication by conveying the university's story using a variety of creative methods including new media, social networking, direct marketing, video, print, web, email, and news outlets
- Enrich engagement by facilitating broad participation, soliciting feedback, and increasing transparency for its many constituents on and off campus
- Increase collaboration by supporting interdisciplinary teams to investigate, study, and work together more effectively

Enhanced communication. A new, comprehensive University Communications Strategic Plan (UCSP) is under development. At the core of the plan is the desire to portray UNLV to its many internal and external audiences in a polished, consistent manner using multiple communication channels. The plan will advance brand identity, broaden awareness of programs and priorities, enhance and protect UNLV's public image and reputation, and increase the visibility of university programs across key audiences.

New communication technologies, policies, standards, and programs will be needed to assist university units in aligning their communication and marketing efforts with the university's evolving communication strategy. UNLV needs to provide:

- Tools to consolidate, coordinate, and analyze the impact of multiple social media platforms
- Assistance in meeting existing standards for official UNLV web pages to improve ease of use for both on and off campus constituents
- Additional resources for web page development in academic departments
- New policies, procedures, and programmatic efforts to protect and strengthen the campus brand
- Tools to ensure consistent and timely distribution of emergency messages (e.g., emergency notification system, email, social media, portals, digital signage, etc.)
- Standardization and expansion of the technology used for digital signage on the campus to allow for the distribution of campus-wide messaging
- Implementation of an enterprise-wide video streaming solution

Difficulty managing the number of new communication venues and the increasing volume of communications across all venues were significant challenges mentioned by students, faculty, and staff during the IT master plan assessment. New tools that allow university units to target communications to specialized audiences will make communications more impactful. Providing tools that allow individuals to filter the messages they receive and customize how they choose to receive

14. Communication and Collaboration Tools

them will empower the recipients to choose how they are informed.

The development of portals for both students and employees will allow individuals to create electronic workspaces that consolidate the information and the applications important to them. While all students and employees will receive emergency and official communications, individuals will be able to tailor communications based on their disciplines and/or areas of interest.

Furthermore, new tools needed to enhance internal and external communication must allow accessibility via mobile devices. Support for mobile access requires enhancements to the campus infrastructure including:

- A more robust wireless environment (See Initiative 11)
- New security measures to accommodate unique features of mobile devices (See Initiative 8)
- Role-based access to UNLV applications and information from mobile devices (See Initiative 10)

Enhanced engagement. Conveying audience-specific information and creating feedback opportunities are central to UNLV's ability to engage its many communities. Existing communication channels need to be enhanced and additional tools procured to improve UNLV's interaction with targeted constituent groups. Campus communication tools must:

- Integrate easily with existing campus survey tools
- Offer multiple feedback solicitation options
- Be accessible from the most commonly used mobile devices
- Interface with Customer Relationship Management applications to coordinate communications with target audiences
- Include assessment tools to measure the impact of engagement across channels and audiences

Strengthening engagement also includes providing timely information to multiple constituent groups who are seeking transparency and accountability. Dashboards are a powerful tool for conveying targeted information, assisting with decision-making, and soliciting feedback. UNLV has multiple tools to create dashboards. Currently those tools are underutilized. The university should offer:

- Greater access to the tools used to develop dashboards
- Training on how to create effective dashboards
- Programming assistance for complex dashboards and/or access to enterprise systems
- Assistance in creating real-time data feeds to ensure currency of information
- Guidelines from university communications on branding
- Assistance with usability testing
- Security measures to ensure protection of personally identifiable data
- Guidance in utilizing dashboard analytic tools to assess effectiveness

The development of a Community Dashboard to communicate UNLV's success to key constituents is

14. Communication and Collaboration Tools

one of the measures of success in achieving the Top Tier Community Partnership Goal. The dashboard will contain metrics such as:

- Incoming admissions statistics, student learning outcomes, and graduation rates
- Number and types of community partnerships formed
- Employment data for UNLV graduates
- Numbers of patents filed, startups created, and startups sustained
- Success of athletic programs and academic success among student athletes
- Results from community satisfaction surveys

Providing services to assist in the creation of additional dashboards around other topics of community interest would enhance transparency and increase community engagement. Other possible dashboards topics could include:

- The status of major campus planning initiatives
- Efforts associated with maintaining and enhancing Minority Serving Institution and Hispanic Serving Institution status
- Progress on the development of a world-class medical school and the availability and quality of all of UNLV's clinical services

Enhanced collaboration. As the campus embarks on its efforts to improve internal and external communications and increase engagement, there is also a need to support new ways for campus constituents to collaborate. In the absence of enterprise-wide options, a variety of collaboration tools are emerging throughout the campus. While each campus entity has unique needs, the proliferation of different products to meet similar objectives makes it more difficult for collaboration between entities. Furthermore, individuals involved in multiple collaborations are using multiple tools, making it more difficult for them to organize and manage their work.

Based on a campus assessment and subsequent conversations with campus groups, it would be efficient and cost effective for UNLV to standardize on the following types of collaboration tools:

- Web conferencing (e.g., WebEx, GoToMeeting, Zoom)
- Teleconferencing (e.g., SoundConnect, Adobe Connect)
- Teamwork facilitation (e.g., Box, Trello)

Expanding use of existing collaboration tools - In addition to introducing new campus-wide technologies to assist with collaboration efforts, expanding use of existing technologies is a viable and cost effective option for meeting UNLV's collaboration needs. For example, the use of WebCampus, the campus learning management system, could be expanded to assist with online components of recruiting, orientation, committee work, training, and professional development needs. UNLV has also made significant strides in adopting integrated cloud-based software. See Table 14-1.

Table 14-1: New UNLV Cloud-based Productivity Suites

Adopted	New Software	Change
October 2014	Google Apps for Education	Employee email moved from Lotus Notes
January 2015	Microsoft Office 365	Individual desktop productivity applications

14. Communication and Collaboration Tools

		moved to a suite of applications in the cloud
August 2015	Adobe Creative Cloud	Individual desktop creative applications moved to a suite of applications in the cloud

These cloud-based services support the way students and employees do their work, enabling users to access their productivity tools anywhere, anytime, and on multiple devices. The new software also makes it easier to share, comment on, and edit files collaboratively.

There are a total of 43 new applications in the new cloud-based suites (see Tables 14-2 to 14-4). The full potential of all the applications is yet to be realized by the campus.

Table 14-2: Google Apps for Education











Icon	Application	Icon	Application	Icon	Application	Icon	Application
	Mail		Groups		Docs		Search
	Calendar		Sites		Sheets		
	Contacts		Drive		Slides		

Table 14-3: Microsoft Office 365

































Icon	Application	Icon	Application	Icon	Application	Icon	Application
	Word Online		Excel Online		PowerPoint Online		OneNote Online
	Video		Delve		OneDrive		Newsfeed
	Sway		Sites		Class Notebook		Staff Notebook

Table 14-4: Adobe Create Cloud

Icon	Application	Icon	Application	Icon	Application	Icon	Application
	Acrobat Pro		After Effects CC		Audition CC		Bridge CC
	Dreamweaver CC		Edge Animate CC		Extension Manager CC		Fireworks
	Flash Builder Premium		Flash Professional CC		Illustrator CC		InCopy CC
	InDesign CC		Lightroom CC		Media Encoder		Muse CC
	Photoshop CC		Prelude CC		Premier Pro CC		Scout CC

14. Communication and Collaboration Tools



SpeedGrade
CC

Together the suites put into the hands of all students, faculty, and staff the same productivity, communication, and collaboration tools. The shared applications create new opportunities for collaboration and make it possible to provide more comprehensive help with use.

While additional tools will still be needed by organizational units and campus groups, the campus community should take advantage of available tools whenever possible. Awareness campaigns, training, and peer-to-peer presentations highlighting how all the new tools can be used to support learning objectives, teamwork, individual productivity, and administrative efficiency are recommended.

Providing the underlying infrastructure - Governance. The strong overlap between the communication needs identified through the IT master planning process and the technology-dependent components of the University Communications Strategic Plan underscores the importance of close coordination between the entities involved in both efforts. To provide that coordination, the governance structures proposed in Initiative 1 include representatives from the units reporting to the Senior Associate Vice President for University Marketing, Communications, and Brand Strategy on the Technology Advisory Committee (TAC) and the Technology Review Board (TRB). That representation should provide a strong and persistent voice in determining campus technology projects and priorities. Moreover, it is recommended that technology specialists with expertise in communication and collaboration tools be represented on the groups created to implement the emerging strategic communication plan.

Furthermore, implementation of the IT project review and purchasing processes outlined in Initiative 4 will ensure that new technologies required to support the strategic communications plan will have the underlying infrastructure needed for implementation, work well with existing campus systems, and have the help-with-use support to ease adoption.

Providing the underlying infrastructure - Unified Communications. A strategically determined set of technologies to improve and enrich the ways the campus community shares information internally and with its many external constituents should be complemented by the ability to receive the most timely and interactive messages across multiple devices and different media types.

In a Unified Communications environment, synchronous (e.g., a phone call) and non-synchronous communications (e.g., voice mail, email) converge. Individuals can send messages on one medium and the recipients can receive the communications in a variety of media. For example, if a phone call is made when the intended recipient is online, the products that comprise the Unified Communications solution can detect that the individual is available for communication (e.g., instant messaging in available mode). When the communication arrives the individual can engage in a text chat, a video chat, or a phone call on a traditional phone, a cell phone, or a computer through a network phone application. If an individual is not available, a message can be left as a voice mail and accessed via a cell phone or through a voice-to-text translation and sent to a text number and/or an email account.

At UNLV the ability to provide Unified Communication services is dependent on interfacing voice and data services offered through Telecommunications (Telecom) and through OIT's Network

14. Communication and Collaboration Tools

Development and Engineering group (NDE). As voice and data technologies have converged, the services provided by the two units overlap. However, the approach to offering these services differs significantly and requires coordination between the two units that often strains limited resources in both groups.

While there is strong agreement that UNLV should provide Unified Communications, there is no agreed-upon and documented strategy for creating that environment. Consequently, each group proceeds cooperatively but independently towards its vision. Recently, the two groups agreed to create one position in each unit that has overlapping expertise with the other unit. While these two positions will help the two groups keep the interdependent technologies working, the effort is not sufficient. The Telecom group and the NDE group need to be merged. The merger will facilitate the university's ability to deliver the full complement of Unified Communications services. The effort is particularly important for the development of more comprehensive and coordinated emergency communications.

As the new CIO seeks to create efficiencies and optimize services (see Initiative 3), consideration of the best organizational alignment of the units providing voice and data services is an important priority to address as early as feasible.

Initiative Owner	Chief Information Officer
Consultative Role	Technology Advisory Committee, Technology Review Board, Office of the Senior Associate Vice President for University Marketing, Communications, and Brand Strategy

Budget Estimate

Three new positions are required to support UCSP initiatives, two in units reporting to the Senior Associate Vice President for University Marketing, Communications, and Brand Strategy and one in OIT. An additional position is required to assist academic departments with web page development. The salary range is \$68,000 to \$73,000 before benefits.

Social media dashboards and content managers to consolidate, coordinate, and analyze the impact of social media platforms range between \$10,000 and \$15,000 annually, depending on the number of users accessing the tools.

Video streaming solutions range from \$50,000 to \$75,000 if strict content deletion schedules are followed, more if materials must be kept for long periods of time.

Portal development will cost \$150,000 one-time for initial implementation and require one new position with a salary range of \$60,000 to \$70,000 before benefits. Assuming existing contracts could be utilized, no additional annual fees are anticipated.

Customer Relationship Management (CRM) costs depend on whether a single tool will meet multiple needs. Use of cloud-based applications will eliminate the need for hardware. Implementation services will be required for the most sophisticated solutions.

The Community Dashboard and other dashboards are likely to be developed by current staff using existing business intelligence and reporting tools.

The web conferencing application will require a site license costing \$50,000 to \$100,000 annually.

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The teleconferencing services are likely to be paid by the entities that use the services; however, brokering a single provider for the services will help keep costs low.

Annual costs for teamwork facilitation tools will be in the \$30,000 to \$80,000 range depending on the size of the deployment.

Annual costs for video content management software to maintain UNLV's video assets are approximately \$50,000 annually.

The costs associated with ensuring communication and collaboration tools are usable in mobile environments need to be included in the development of the mobile strategy (see Initiative 11).

Merging the units responsible for the delivery of the voice and data infrastructure on campus is not likely to produce any costs savings but will optimize limited resources to create an easier-to-manage converged infrastructure and provide more seamless services.

New Positions: 4 FTE; Total One-time and Recurring Costs FY16-FY19: \$2,314,575

Action Items to Implement Initiative

1. Implement tools to consolidate, coordinate, and analyze the impact of new social media efforts.
2. Provide assistance for meeting official UNLV web pages standards.
3. Increase assistance for web page development in academic departments.
4. Standardize and enhance campus-wide digital signage services.
5. Expand video streaming solution enterprise-wide.
6. Implement a student portal with single sign-on allowing access to multiple campus applications.
7. Implement an employee portal with single sign-on allowing access to multiple campus applications.
8. Provide integrations for Customer Relations Management tools.
9. Support dashboard development.
10. Adopt enterprise-wide web conferencing, teleconferencing, and teamwork facilitation solutions.
11. Extend the use of the learning management system beyond course delivery.
12. Offer awareness campaigns and training on using cloud-based tools to support collaboration.
13. Merge the units that provide the infrastructure for voice and data services.

Anticipated Benefits

- UNLV's public image and reputation is enhanced and protected.
- Increased visibility of university programs across key audiences.
- Increased ability to manage multiple social media platforms.
- Customized portals enable students and employees to effectively manage information.
- Consistent and timely distribution of emergency messages improves campus safety.
- More effective communication through targeted messaging.
- Enhanced ability to engage targeted constituent groups.

14. Communication and Collaboration Tools

- Improved collaboration by deploying new enterprise-wide collaboration tools.
- Increased teamwork, productivity, and administrative efficiency by maximizing the utilization of existing communication and collaboration tools.
- Access to a robust Unified Communications environment at UNLV.

Measures of Success

- ☒ Satisfaction with tools to optimize internal and external communication.
- ☒ Additional traffic on campus social media sites.
- ☒ More consistency across campus web pages.
- ☒ Satisfaction with web page development services.
- ☒ Increased use of digital signage on campus.
- ☒ Increase in targeted messages and a decrease in broadcast messages.
- ☒ Satisfaction with new dashboards.
- ☒ Number of new enterprise-wide collaboration tools.
- ☒ Increased use of existing enterprise-wide productivity, communication, and collaboration tools.
- ☒ Increase in converged voice and data communication services.

Contextual Information

Peer Institution Research. Arizona State University (ASU) has four methods for conference calling. Each method is provided by a different system. The systems have varying capabilities (e.g., moderator and/or use passcodes or no passcodes at all; scheduled or impromptu) and limitations (e.g., number of users varies from 6 to 48; some can only be used with certain types of telephones). A comprehensive guide to the services including a short video comparing the systems and online instructions for use of each system has been created.

For web conferencing, ASU has secured a campus license for Adobe Connect, an enterprise web conferencing solution for online meetings, eLearning, and webinars. The service is licensed for faculty and staff use only. However, students and guests may participate in sessions hosted by a faculty or staff member.

SECTION 5 – IT MASTER PLAN INITIATIVE MATRICES

The IT Master Plan Initiatives Financial Matrix, on the following page, provides a summary of the costs of the key elements in the 14 initiatives plus the three core theme initiatives. Following the Financial Matrix is a Timeline Matrix that presents an overview of timing, dependencies, and funding for the action items.

Cost estimates within the matrices reflect additional costs. When proposed new services replace currently funded services technology Include an estimate of cost savings for technology services being replaced). Other potential cost savings identified throughout this Plan will need to be quantified when operationalizing each initiative.

Even with the proposed cost increases, UNLV will remain “below average” in terms of IT spending compared to other peer institutions based on national research provided by EDUCAUSE.

Note: All estimates contained herein are for planning purposes only, are subject to change and should not be considered final. They serve as a starting point for further discussion.

SECTION 6 – APPENDIX OVERVIEW

Lettered appendices (A-E) are general in nature and reflect supporting deliverables that preceded the IT Master Plan, or support the Plan in its entirety.

Numbered appendices are labeled and referenced in support of a specific initiative. For example, appendix “5A” directly supports Initiative 5 of the Plan.

Appendix A: 2013 UNLV Technology Community – A full list of the UNLV technology community, which includes OIT staff, technology liaisons, and other members of both academic and administrative distributed technology, as well as external and internal entities that impact the technology environment at UNLV. UNLV does not maintain a dynamic list of technology positions. This list was compiled in 2013 as part of the IT Master Plan Environmental Assessment.

Appendix B: IT Master Plan Strategic Issues – The list of strategic technology issues identified in the Current Information Technology Environment Report (February 2013). The strategic initiatives described in the Plan are intended to address these strategic issues.

Appendix C: Work Session Meeting Recaps – Recaps are provided from each of the Strategic Technology Planning work sessions. These are intended to demonstrate the process that was used to develop the strategic initiatives.

Appendix D: Resource Considerations – Provides additional details and background information for considering strategies to resource plan initiatives.

Appendix E: IT Service Management Background – Provides background information associated with a best practice approach to IT Service Delivery.

Appendix 1: Governance of IT

- A. UNLV Information Technology Governance Group Membership and Charges

Appendix 3: IT Leadership and Coordination

- A. General CIO Responsibilities

Appendix 4: IT Projects

- A. UNLV IT Project Review Process

Appendix 5: IT Service Coordination

- A. Developing the IT Service Portfolio and the IT Service Catalog
- B. List of Common Good Services at the University of Minnesota

Appendix 6: Sustaining Technology Investments

- A. Building a New Model for Sustaining IT Investments

Appendix 8: Information Security

- A. UNLV Cyber Security Team Membership and Charges

Appendix 10: Identity Management and Single Sign-On

- A. Challenges Resolved with Effective Identity Management
- B. Identity Management Implementation Three-Year Action Plan

Appendix 11: Mobility

- A. Current UNLV Mobile Applications
- B. Map of Current UNLV Wireless Coverage

Appendix 12: Enterprise-wide Document Management

- A. Academic Program Needs for Document Management

Appendix 13: Leveraging Institutional Data Management

- A. UNLV Data Governance and Business Intelligence Background

Appendix F: Glossary of Terms and Acronyms

Appendix A: 2013 UNLV Technology Community

The UNLV technology community is comprised of the Office of Information Technology and members of the distributed technology community. This list was compiled in 2013 as part of the IT Master Plan environmental assessment.

Division	Position Title
Academic Affairs	Academic Affairs Analyst
	Advising Database Analyst
Academic Resources	Space Planning Analyst
Advancement	Web Designer & Development Specialist
	Director of Web & Electronic Communications
	Web Services Manager
	Web Services Designer
	Public Information Specialist
	Web Content Specialist
	IT Professional 2
	Public Affairs Specialist
	Media Relations Specialist
	Director of Information Technology & Records
	Systems Administrator & Facility Operations Manager
College of Education	Web Designer / Manager
College of Engineering	Systems Administrator
	Senior System Analyst College of Engineering
College of Fine Arts	Information Technology Specialist
College of Sciences	Computer Systems Programmer
Educational Outreach	Data Collection Supervisor
	Instructional Applications Developer
	Instructional Designer
	Instructional Designer
	Server Administrator Technician
	Instructional Applications Programmer
	Compliance & Data Analyst
	Instructional Designer
	Instructional Designer

Division	Position Title
	Instructional Designer
	Instructional Designer
	Web Manager
Finance and Business	Director of Delivery & Telecommunication Services
	Software Engineer
	Human Resources Systems Manager
	Application Programmer
	IT Technician 5
	Systems Manager
	Application Developer/Web Developer
	Chemical Information Officer
	Assistant Director, Fire & Life Safety Systems
	Occupational Safety Program Officer
	Process Analyst/Trainer - Student Accounts
	Digital Telecommunications Specialist 1
	Assistant Director of Telecommunication Services
	Applications/Web Developer
	Digital Telecomm Specialist 1
	IT Professional 3
	Communications Sys Special 2
	IT Technician 6
	IT Technician 6
Hank Greenspun School of Journalism/Media	Media Engineer
William F. Harrah College of Hotel Administration	IT Technician 5
Intercollegiate Athletics	Assistant Director, Athletics Media Relations
	Sports Information Specialist
Lee Business School	Information Technology Coordinator
	Communications Specialist
Library	Library Data Analyst
	Web Content Manager/Usability Specialist

Division	Position Title
	IT Technician 4
	Systems Administrator
	IT Professional 3
	IT Professional 2
	Library Systems Manager
	IT Technician 6
	IT Technician 6
	Systems Administrator
	Web & Digitization Application Developer
	Web Designer
	Director, Libraries Technologies
Office of Information Technology	Senior Network Engineer
	WebCampus Administrator
	Operations Analyst
	Technical Administrator Lead
	Computer Facilities Supervisor
	Associate Network Engineer
	Senior Network Engineer
	Desktop & Field Services Manager
	IT Technician 5
	IT Help Desk Supervisor
	IT Help Desk Supervisor
	Systems Administrator
	IT Technician 6
	Computer Facilities Supervisor
	Director of OIT Operations
	IT Technician 5
	Assistant Director, Instructional Technology Services
	Computer Facilities Supervisor
	Operations Analyst
	Infrastructure Analyst
	IT Technician 5

Division	Position Title
	Desktop Support Supervisor
	IT Technician 4
	IT Technician Supervisor
	Network Development & Engineering Manager
	Google Application Administrator
	IT Technician 4
	IT Technician 5
	IT Technician 5
	Computer Facilities Supervisor
	Senior Software Developer
	Systems Administrator
	Senior Database Administrator
	PeopleSoft Administrator
	Software Engineering Services Manager
	Senior Software Developer
	Senior Systems Administrator (Lotus Domino)
	Applications Security Agent
	Director of IT Infrastructure
	Systems Administrator
	Web Design and Development Specialist
	Software Developer
	Senior Software Engineer - Identity Management
	Database Administrator
	Systems Administrator
	Senior Database Administrator
	Systems Administrator (E-Mail)
	Senior Systems Administrator
	Systems Engineering & Administration Manager
	Senior Software Developer
	Application Security Agent
	Systems Administrator
	Technical Administrator

Division	Position Title
	Senior Software Developer
	Senior Database Administrator
	IT Portfolio Coordinator
	Portal Content Coordinator
	Associate Vice Provost for Information Technology
	Oracle Application Server Administrator
	E-Learning Coordinator
	IT Business Manager
	Information Technology Security Officer
	Vice Provost for Information Technology
	IT Communications Coordinator
	Computer Facilities Supervisor
Faculty, Policy & Research	Senior Data Warehouse/Business Intelligence Developer
	Information Architect & Manager, Metadata/OBIEE Administrator
	Manager, Data Systems & Applications Developer/EPM Data Architect
	Director, Institutional Reporting
Research and Graduate Studies	Programmer
	Software Developer
	Director Center for Health Information Analysis
	Software Developer
	Software Developer
	Admissions & Records Analyst
	Senior Graduate Admissions & Records Analyst
	Senior Graduate Admissions & Records Analyst
	Computer Systems Analyst
	Computer Systems Analyst
	Computer Systems Analyst
	Computer Systems Analyst
	Information Systems Manager
	Web Communications Specialist
	Computer Systems Analyst

Division	Position Title
	Computer Systems Analyst
	Computer Systems Analyst
	Senior Computer Analyst
	Computer Systems Analyst
	Director, Supercomputing Center
	Senior Systems Analyst
	Network Security Administrator
	Systems Analyst
School of Dental Medicine	Systems Administrator
	Computer Specialist (System PC Tech)
	Systems Administrator, Front End
	Manager, Dental Laboratory Services
School of Nursing	Web CT and Web Manager
	Senior Technician
	Simulation Clinical Technician
Student Affairs	IT Technician 2
	Registration and Systems Coordinator
	Information Technology Coordinator
	IT Coordinator
	Information Technology Coordinator
	Director for Information Technology
	Information Coordinator
	Executive Director of Enrollment Technology
	Director, Student Information & Systems Design
	Executive Director for Student Systems
	System/Database Administrator
	Web/Database Programmer
	Assistant Registrar, SIS Administration
	ERP Functional Lead – DARS
	Database Analyst/Administrator
	Assistant Director Campus Card Technical Services

Division	Position Title
	Network Analyst/Administrator
	Budget Analyst
	Medical Technologist/Laboratory Manager
	Technical/Systems Administrator
	Health Information Coordinator 1
Teaching & Learning	Senior Application Developer
William S. Boyd School of Law	Computer Services Specialist
	Database & Systems Development Manager

Appendix B: Strategic Technology Issues Identified in Campus Assessment

Based upon their interactions with university stakeholders, BerryDunn developed the Current Information Technology Environment Report (February 2013) identifying 29 strategic technology issues that were used to inform the development of the IT Master Plan. The issues address people, processes, and systems that serve and support the university today. Some issues focused primarily on OIT, while others were largely associated with distributed technology needs.

The issues were categorized as follows:

- **Building the Foundation for Strategic IT Governance and Leadership** – related to organizational structure, management, staffing and planning. The category also included issues related to communication and governance.
- **Providing Campus Support** – related to types of technology services delivered and their service audience.
- **Promoting Student Learning Success** – related to technology security, systems, applications, hardware and software.
- **Advancing and Supporting Research, Scholarship and Creative Activity** – related to technology security, systems, applications, hardware and software.
- **Creating Community** – related to technology security, systems, applications, hardware and software.

Within each category, issues are presented in a general order of priority. A short title has been added to help the reader track the issues. Finally, each issue was further prioritized and refined during the planning process.

How Technology Issues Identified During the Campus IT Assessment are Addressed by the IT Master Plan

Issue	Description	Plan
1. Campus-wide IT Leadership	The university does not have an IT leadership role that encompasses the entire IT community.	Initiative #3
2. IT Governance	The university does not have a sustainable IT governance structure that fosters enterprise-level collaboration among academic, administrative, and executive stakeholders with respect to IT decision-making and planning.	Initiative #1
3. Sustainable IT Planning	The university does not have a sustainable strategic IT planning process.	Initiatives #1, #2
4. IT Project Definitions, Prioritization, and Management	The university has not adopted standard methodologies for tracking IT projects and associated resources that are needed to support project-related activities.	Initiative #4
5. Coordination for IT Purchasing	The university's IT purchasing practices do not promote coordination or standardization.	Initiative #4
6. Governance and Support for Institutional Data Management	IADS has established the foundation for sound data management practices and has begun to define the role	Initiative #13

Issue	Description	Plan
	and responsibilities for an effective data governance model, but UNLV has not adopted a University-wide data management and decision support strategy.	
7. Strengthening University Information Security Policies	UNLV has not implemented a comprehensive enterprise IT security program for strengthening and maintaining IT security across the university.	Initiative #8
8. Redundant Systems and Applications	There are numerous instances of systems and applications that are providing potentially redundant services for different units across campus.	Initiatives #5, #6
9. Technology Replacement Planning	The university does not have a technology refresh program with consistent funding.	Initiative #6
10. Campus-wide IT Service Delivery	The university has not clearly defined the roles and responsibilities of distributed IT and OIT.	Initiatives #3, #5
11. IT Service Agreements	The university does not consistently establish or maintain formal agreements to help set expectations for IT service delivery and resource availability.	Initiative #5
12. Expanding Self Service Functionality	The university is not effectively leveraging self-service functionality to reduce the burden on staffing resources.	Initiatives #9, #10, #14
13. Location of OIT Resources	The physical distribution of OIT staff across campus leads to service delivery challenges.	Initiative #3
14. Server Locations Across Campus	Many departments are currently hosting their own servers in spaces that are not equipped with the appropriate physical or environmental security.	Initiatives #6, #8
15. Disaster Recovery Planning	The university has not established a process for developing, testing and maintaining a comprehensive Disaster Recovery Plan.	Initiatives #6, #8
16. Data Storage Access and Capacity	The university lacks the ability to store the university's data within a system to provide proper usage and protection of data.	Initiative #13
17. Increasing IT Training Awareness	The lack of coordination among IT training and service providers across campus has led to inefficiencies in service delivery and inconsistent awareness among stakeholders.	Initiative #7
18. Enterprise Level Identity Management	The university has not established an enterprise level identity management program.	Initiative #10
19. Establishing Enterprise Document Management and Imaging Services	The university has invested in an Enterprise Content Management (ECM) solution for document imaging and workflow; however, there is not clear plan for how this system will be deployed and supported at an enterprise level.	Initiative #12

Issue	Description	Plan
20. Evaluating the Future of Lotus Notes	Most of the university's faculty and staff were not satisfied with the use of Lotus Notes. Although UNLV's transition to Google Apps in 2015 addressed many of these issues further improvements are recommended.	Initiative #14
21. Network and Telecom Infrastructure to Support Growing Demand for Connectivity	The university lacks proper bandwidth and campus wide connectivity strength to provide the necessary tools for students, faculty, and staff.	Initiatives #6, #11, #14
22. Electronic Workflow for Business Processes	There are numerous instances of manual processes across campus that could be eliminated by implementing electronic workflows.	Initiatives #9, #12
23. Computer Labs for Access to Specialized Software	The university does not have a clearly defined computer lab support model that can support a mobile technology environment.	Enabling The Mission: B
24. Strengthening IT Support for Pedagogy	The university has not established a training resource that sufficiently compensates for the elimination of the Teaching and Learning Center (TLC).	Enabling The Mission: B
25. Evaluating Needs for Technology Equipped Learning Spaces	The university lacks the appropriate number of technology classrooms and computer teaching facilities to fill the needs of professors and students.	Enabling The Mission: B
26. Strengthening IT Support for Research	The university has not established a plan for how technology can effectively support research initiatives and the growth of research funding opportunities at UNLV.	Enabling The Mission: A
27. Creating a Community – Departmental Websites	The university has not established a consistent web presence.	Initiative #14 Enabling The Mission: C
28. Coordinating Efforts around Digital Signage	The university lacks a coordinated effort to unify the campus in its digital signage efforts.	Initiative #14
29. Mobile Computing Support Services	The university has not established a service structure for supporting the development of mobile computing tools and applications.	Initiative #11

Appendix C: Work Session Meeting Recaps

Recaps are provided from each of the strategic technology work sessions. The summaries highlight the processes used and the key conclusions reached.

Core Team Session “A” – March 19, 2013, 9:00 AM to 2:00 PM, HWB 102

Creating the UNLV IT Master Plan and Setting Strategic Vision

Primary Objectives:

- Current Environment Report and how it informs IT Master Plan development
- Review input provided from college meetings conducted in February 2013
- Determine the scope of strategic IT planning for the university
- Establish a mission and vision for technology at UNLV
- Confirm strategic themes and discuss schedule for remainder of the planning process
- Consider peer institution research results

Session Summary:

The March 19 meeting served as a kickoff to the planning process and further defined the roles and responsibilities of the Core Team. The group addressed several key questions that served as planning questions for additional work sessions, including, but not limited to; How can UNLV use resources more effectively and efficiently to improve productivity? Does UNLV have a 21st century IT “system”? How does UNLV improve IT support for research that aligns with university priorities?

Other questions posed included, how does the IT Master Plan help build an IT community? Does UNLV need a new IT governance framework? If yes, then what is the impact on decision-making and current processes? In short, changing IT governance will create a cultural shift at UNLV and this current culture goes well beyond IT. The IT Master Plan must better define the roles and responsibilities for both front end/back end IT services. And IT needs to be part of the strategic planning of UNLV to improve IT priority setting and strengthen the allocation of limited resources.

Key outcomes identified to inform the IT Master Plan:

The session concluded by identifying key IT Core Values that should serve to inform and guide the planning process and help set the direction and tone of the IT Master Plan in general. The Core Values include:

- **Collaborate** and build trust through improved communications and delivery of quality services
- **Leverage** IT to improve productivity
- **Intentional** utilization of IT
 - Redundancy only when necessary
 - Improved resource allocation

- Better defining of roles and responsibilities
- **Adaptive** IT to meet changing university needs and competing IT priorities
- **Accountability** through a culture of continuous improvement
- **User-centered** evaluation, assessment, and feedback
- **Innovation** by encouraging risk takers, discovery, creativity, and experimentation

Faculty Planning Work Session “B” – March 20, 2013, 9:00 AM to 2:00 PM, LLB 2281

The Faculty Experience: Teaching and Learning – Supporting the Experts in their Delivery of Academic Excellence

Primary Objectives:

- What technologies should characterize the UNLV learning environment?
- What services will best support faculty? What tools will enhance pedagogy?
- How can technology help UNLV be most competitive in attracting faculty?
- How does UNLV define its eLearning in light of NSHE initiatives such as the “Katz Report”?

Session Summary:

The session focused on key issues facing both faculty and students. Basic themes considered the current state of technology at the university and how the IT Master Plan would balance its approach to be visionary, but not reactionary, to the ever changing technology landscape. Much of the discussion was focused on how technology improvements and planning could impact the ongoing effort of the “Excellence in Education Working Group.” To this end, participants considered the following areas: classroom experience; assessment of education; enhancing faculty role in program development, and support for the faculty role in student persistence and success.

Key outcomes identified to inform the IT Master Plan:

- The trend is towards more collaborative workspaces for students and faculty
 - UNLV will need to consider how best to balance increasing demands for virtual/physical collaborative workspaces
- Better data access for faculty and improvised system integration of existing UNLV data repositories
 - Examples of homegrown databases were provided, including a sophisticated FileMaker Pro system developed by a Department Chair that works well, but does not allow for easy integration with other databases
 - Data standards will continue to be addressed and data management will need to be a key component of the IT governance work session

- Technology needs to support productivity gains
 - Manual processes need to be automated wherever possible to increase productivity and leave more time for teaching and learning
 - Seek automation of basic tasks to allow for higher level analytics through continuous improvement
- Innovation and discovery in support of faculty development
 - How can UNLV provide a better “sandbox” for faculty to learn about new technologies and support pedagogical discovery?
 - Knowledge management/information sharing and coordination of resources. Is there a way to improve the communications and coordination of faculty usage of technology through some type of “Knowledge Management System”?
- In general, UNLV needs improved communications around technology planning
 - IT governance is a black hole that needs to be addressed
 - Priority setting that focuses on completing initiatives and improving service delivery
 - Leveraging existing IT investments to improve productivity

Research Planning Work Session “C” – April 9, 2013, 9:00 AM to 1:00 PM, HWB 102

Advancing and Supporting Research – Defining the Technology Resources of a Global Research Institution

Primary Objectives:

- What infrastructure and capabilities are needed to support the research environment?
- What role will research computing play in growing the research capacity at UNLV in the next five years?
- How can the IT environment be both flexible and adaptable?
- How can research IT be made more sustainable?
- What role should the central IT function have in supporting these objectives?

Summary of Session:

The Research Planning Work Session brought together a variety of stakeholders representing a diverse set of research needs as well as staff from finance and IT services areas (both central and distributed) to discuss how the university can better coordinate and deliver IT services that will support UNLV’s strategic direction of growing its research presence and reputation. UNLV must address new requirements for managing data security and provide a robust IT infrastructure to meet federal grant specifications.

Key outcomes identified to inform the IT Master Plan:

- The research community is expected to be entrepreneurial. How can this be balanced with the need for improved coordination and collaboration to ensure that compliance and administration requirements are met?
- Institutional awareness needs to increase across UNLV of what the needs of the research community are and how best to support a diverse and ever-changing portfolio of research efforts.
- Primary issues that challenge the current research environment include, but are not limited to:
 - Capacity of technical staff to support and expand research portfolio
 - Software and applications specific to research that may not be supported by central OIT
 - Storage for increased data, the overall growth of storage demands, and how best to address this going forward
 - Advanced instrumentation requires special skill sets that most central IT staff cannot support
- Areas to address within the context of the IT Master Plan include:
 - Data management, data governance, and data classification need to include the research community. Researchers have different needs than both administrative and academic groups.
 - Big data = big storage needs; what is the best approach to meeting this infrastructure need?
 - The lack of consistent refresh of computers/hardware is a potential security risk.
 - Bandwidth, many buildings lack adequate bandwidth (ex. WHI). What is the baseline need for research going forward, a 100Gb network?
 - The nature of research makes funding inconsistent and less sustainable, but it is critical to plan for research needs and to provide maintenance to an IT infrastructure that is not typically funded long-term.
 - UNLV needs a better definition of roles and responsibilities within the IT community.

Student Planning Work Session “D”¹ – April 10, 2013, 9:00 AM to 1:00 PM, LLB 2281***The Student Experience: Access, Mobility, and Success*****Primary Objectives:**

- What services will best support the student experience?
- What technologies should characterize the UNLV environment?

¹ In addition, BerryDunn participated remotely in an additional student work session convened on April 3, 2013. Notes from that meeting are included in this summary and were considered in the development of this document.

- How can technology help UNLV be most competitive in attracting students?
- What student-centered processes can be strengthened through technology?
- What are the key initiatives underway or planned that will strengthen student support?

Summary of Session:

The student session was the largest work session of the ones held to date, with over 20 participants. A large portion of the meeting focused on how the IT Master Plan could improve student-centered processes and identifying what tools would strengthen communications with students. In addition, we discussed the results of a meeting with members of the Student Technology Advisory Board (STAB) held the week prior that discussed a number of key concerns that students voiced.

Issues addressed in the April 3 meeting included, but were not limited to, the need for single sign-on and fewer passwords for students to manage, more mobile access to information, and the need to create some type of student dashboard that could better personalized the UNLV experience. Students also voiced their desire to better understand the full scope of IT resources available to the campus community regardless of whether they are graduate, residential, or online students (or all of the above).

Students are seeking more online services and the following specifics were brought up: calendar-based registration; the ability to manage parking online; more advising services through better availability such as some type of 24/7 help line for student advisement. Finally, students need more collaborative workspaces beyond the library.

Key outcomes identified to inform the IT Master Plan:

- What services are critical to students?
 - Help Desk—students want one-stop help and acknowledgement that the non-traditional student is traditional at UNLV. This means that help desk support needs to reflect the 24/7 demands that some students have.
 - Wireless infrastructure needs to be reliable, consistent, and everywhere on campus.
 - UNLV needs to focus on communication tools that support student success. Better services for advisement and streamlined processes that make it clear what steps a student needs to complete to get the courses they are seeking. Many UNLV students are first generation and technology could be a tool to improve their retention if properly leveraged.
 - A specific frustration point for students is email. The email vehicle is fine, but an overall lack of coordination among UNLV departments and services (both academic and administrative) leads to what students consider an excessive amount of email that makes it difficult for them to identify what is important.
 - Developing more self-service applications will also help some students, but it should not always be expected that this will substitute for face-to-face communications and guidance from staff and faculty.

- How can technology help attract students to UNLV?
 - It needs to be reliable, consistent, and supported.
 - Mobile technologies are critical to students today. It is considered a basic must have.
- What student-centered processes will be strengthened by technology?
 - Degree mapping
 - Creation of a degree database
 - Improved processes and infrastructure that support identity management

Another key point to remember is that although today's student is technology dependent and expects to have access to mobile technologies and information on a 24/7 basis, the human factor remains central and paramount to the UNLV student experience.

IT Security Work Session “E” – April 11, 2013, 9:00 AM to 1:00 PM, CBC B117

IT Security – Establishing a Sustainable Model for Protecting Data and Building Security Awareness Using a Campus-wide Approach that Supports Academic Freedom and Research Objectives at UNLV

Primary Objective:

- Establishment of a security management structure with clearly assigned security responsibilities
- Creation, implementation, and regular review of IT policies and procedures
- Creation, implementation, and updates to plans to address identified risks
- Implementation of effective security-related education and awareness programs
- Provisions to monitor the security program's effectiveness with mechanisms to make changes as necessary

Summary of Session:

The IT security session addressed current security issues and concerns as a starting point for developing a plan for changing how the university manages and addresses IT security across the enterprise. The meeting included representatives from System Computing Services (SCS), OIT, and distributed IT areas. A detailed update on progress made in addressing the NSHE UNLV Network Audit conducted in 2011 was also provided.

It was agreed that the minimum need for IT security is to reduce the number of data breaches as well as the cases of stolen technology that result in a compromise of sensitive information. The objective of the IT Master Plan should be to assist the university in moving in this direction through improved planning and coordination of resources, implementation of security best practices, and better education.

Key outcomes identified to inform the IT Master Plan:

- Elevate the visibility of information security across the university
 - Consider establishing the role of a Chief Information Officer (CISO), considered a best practice for institutions as complex and large as UNLV, and consistent with NSHE policy
 - Secure Cabinet approval for the authority of the CISO and associated office
 - Define the responsibilities of the CISO office (e.g., security analysis, investigations, risk assessment, management of a UNLV Cyber Security Team, security policies and procedures, security awareness)
- Establish a Cyber Security Team at UNLV
 - Charge the team with supporting ongoing information security efforts in the context of accepted practices
 - Appoint security liaisons from across UNLV who would coordinate with the Cyber Security Team
- Develop comprehensive education, awareness, and training programs
 - Emphasize that data security is everyone's responsibility
 - Create a Security 101 training program (currently being worked on in OIT)
 - Work with Human Resources to develop appropriate orientation materials for new employees
- Create a sustainable risk assessment function that is based on industry standards and best practice
 - Consider using the National Institute of Standards and Technology risk assessment framework
 - Establish risk-based decision-making factors in support of improved IT security practices
- Strengthen the security posture of UNLV through the implementation of the Identity Management initiative
 - Determine practical methods for addressing security issues associated with the increasing presence of mobile devices on campus
- Ensure data governance needs are addressed within the context of information security
 - Develop a tiered classification system for UNLV data (see SCS and Michigan Technology University Information Security Plan for examples)
 - Establish a baseline for data security around compliance requirements (e.g., FERPA, HIPPA, etc.)
 - Consider the need for data classification systems for different types of data (academic, administrative, student, and research)

IT Services Work Session “F” – June 11, 2013, 9:00 AM to 1:00 PM, LLB 2281

Addressing IT Services – Defining the Roles and Responsibilities of UNLV’s IT Community

Primary Objectives:

- What services are needed? What aspects (type, location, etc.) need to be considered to effectively meet the needs?
- How are IT services needs efficiently delivered?
- Which core services need to be managed centrally?
- Are there IT services currently provided that should be discontinued?
- IT service delivery is responsive and adaptive – how is this accomplished?
- How can UNLV maintain effective coordination between central and distributed IT services?
- Is there a changing skill set needed to provide IT services today?

Summary of Session:

During the IT services session, participants considered the concept of IT services while identifying unique UNLV components that would remain relevant and significant over the next five years. The meeting included participants from administrative and academic departments, faculty, distributed IT, and OIT.

Participants took part in two exercises. The first exercise had participants identify the most important IT services for the next five years, considering both new and existing services. In the second exercise, participants were teamed up to consider and define elements of particular IT services that will be important to UNLV in the future. Each team then shared its findings and these are described under the heading “Future IT Services.”

By the completion of the session, it was agreed that the university needs a sustainable process for making decisions about which IT services to provide, how those services should be provided, and how those services will be communicated and rolled out to the campus community. Accordingly, an initiative of the IT Master Plan should be to assist the university in establishing a process for proactively managing an IT Service Portfolio.

Key outcomes identified to inform the IT Master Plan:

- Ongoing support and training are important elements for every service
- UNLV needs services that will support greater use of data

- A research support service will be to better enable lifecycle management of research data (particularly, with respect to sharing and protecting research data)
- Simplifying, collaborating, and communicating more often
- The UNLV community needs continuous involvement and assessment of services from the campus IT community

Future IT Services:

Participants were assembled into four groups which were given a previously identified priority service unique to UNLV that would remain relevant over the next five years. They were asked to consider this service in the context of delivery, design, management, communication, and development.

- Identity management
 - Delivered through centralized resources, management, security, and analysis
 - Value to collecting, managing, and maintaining constituent identification
 - Designed centrally in a secure manner which allows for “opt-in” registration and consistent documentation
 - Managed through a centralized IT approach with prioritized governance and assessment procedures
- Reporting and decision-making tools
 - Data matrix needed to identify procedures, behaviors, frequency, elements
 - All in one place, coordinate, deliver it up
 - Need to recommend appropriate staffing levels
- Desktop virtualization
 - Delivered by a third party – supports virtualized access to applications and data
 - Value in running applications and data through the cloud where there is increased file synchronization and accessibility is granted anytime, anyplace, anywhere
 - Development and implementation entails a phased approach with voluntary options, beginning with files, then allowing others to opt-in for fully virtualized applications
 - Communicated through decision-making processes and sharing results
- Expertise sharing across the campus community
 - Entails tapping key IT leaders and staff to establish and manage a community that works to define its structure and service
 - Includes web pages, IT forums, university listservs, and other communication mechanisms
 - Need to establish relationships between experts and users by reinforcing, encouraging, and requiring participation

Future IT Services (Full List):

<ul style="list-style-type: none"> • Expertise and resource sharing (across the UNLV community) • Secure and protected file backup and storage • Desktop connected conferencing • Application development services to solve an application need • Organizational approach/service to solve a functional need through the utilization of technology • Integration and interoperability planning • Web usability service • Identity management service • Analytic services • Support for reporting and decision-making tools • Managing big data in support of operational purposes • Digital signage and way finding services 	<ul style="list-style-type: none"> • Providing tools and services to help/enable document management and associated workflow • Business process services • Life cycle management of data • Providing desktop virtualization – enabling anytime/anywhere access • Routing and tying-in information that comes into campus • Data and information governance self-service • Computer hardware, infrastructure, and refresh services • Local support people who know the functions and technology that support those functions • Warm hand off services for requesters • Centralization, ownership, generation, and integration of email address
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IT Service Portfolio Management Initiative:

- The university needs a process for making decisions about which IT services to provide, how those services should be provided, and how those services will be communicated and rolled out to the campus community.
- This process should be sustainable, ensuring that existing services and service needs are periodically evaluated and revised as needed, taking into account changing environmental factors such as technology changes, service delivery options, service demand, and resource availability.
- At a high level, this process should be considered in the context of IT governance. This helps clarify who is responsible for making decisions about IT services and how best to engage stakeholders in planning and gaining buy-in for new service delivery models.

A Process Relevant to Considering IT Services:

1. Assess need and impact
2. Define the service
3. Decide on the scope
4. Identify delivery methods
5. Decide upon centralized or decentralized structure
6. Maintain communication throughout the process

7. Monitor and proactively manage
8. Consider third party delivery
9. Identify inefficiencies and determine suitable exclusions

IT Infrastructure Work Session “G” – June 12, 2013, 9:00 AM to 1:00 PM, LLB 2281

Creating a Robust Infrastructure – Building the Technology Foundation for a 21st Century Academic and Research Institution

Primary Objectives:

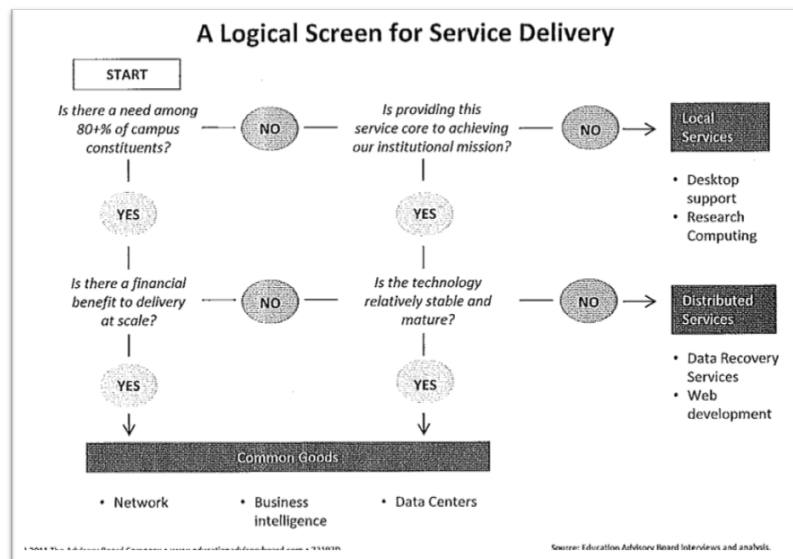
- Identity infrastructure for the future
- Connections needed
- Capacity (storage, bandwidth, etc.)
- What will be required in terms of personnel and finances to maintain and refresh infrastructure?
- Leveraging the cloud

Summary of Session:

During the IT infrastructure session, participants considered future infrastructure needs and how subsequent distribution and implementation of these needs impacts personnel and resource needs. The meeting included participants from administrative and academic departments, faculty, distributed IT, and OIT.

During this session, participants took part in two exercises. The first exercise had participants define the purpose and role of IT infrastructure while highlighting key components unique to UNLV as a whole. In the second exercise, participants were teamed up to consider the main components of IT infrastructure. Each team shared its findings.

Many components of IT infrastructure were discussed, including hardware, software, network, facilities, refresh, etc., that are needed to support and maintain the campus technology environment. At the conclusion of the session, it was agreed that the most important components of infrastructure for UNLV future technology planning will be connectivity, resources, and trust.



Key outcomes identified to inform the IT Master Plan:

- Connectivity
 - Includes traditional, wireless, cellular, ISPs, encryption, authentication, and protocols
 - Seeking ways for students, faculty and staff to connect anything, anytime, anywhere
 - Need methods of quantifying, translating, and communicating needs
 - Plan for the thoughtful phase out of outdated technology (e.g., Cable TV)
- Resources
 - Includes cloud solutions, outsourcing, new approaches to data center and enterprise services, staffing shifts to subject matter experts who manage programs and develop solutions, all captured within a catalog of services by function
 - Seeking ways to be more collaborative, integrative and concentrated on program development as opposed to task-focused
 - Consider reducing local infrastructure and overlapping functions (e.g., web masters)
 - Consider options for focusing IT staff resources on the community they serve and leverage hosted services to strengthen effectiveness.
- Trust
 - Includes security, reliability, planning, compliance, capacity, planning and program information office
 - Seeking ways to implement identity management, enforce governance policies, simplify and improve customer experience, and increase staff while avoiding duplication of efforts
 - Need satellite systems for identity management

IT Governance Work Session “H” – June 13, 2013, 8:00 AM to 1:00 PM, CBC B117***Defining the Governance of IT – The Value of IT Governance and How to Sustain the Process*****Primary Objectives:**

- What does IT governance entail? What is it, and what is it not?
- Maintaining commitment and support
- Sustaining and institutionalizing the process
- Establishing transparency and communication mechanisms
- A governance charter
- Connecting with the Cabinet
- Creating an annual planning calendar (align with the business cycle of UNLV)

Summary of Session:

During the IT governance session, participants considered the purpose and role of IT governance and identified a potential model going forward. The meeting included participants from administrative and academic departments, faculty, distributed IT, and OIT.

The session entailed defining the purpose and role of IT governance in light of the UNLV environment. Participants were then teamed up and asked to consider aspects of the proposed model in context of criteria for effective IT governance, considering values, vision, procedure, scope, and overall structure. Each team then shared its findings.

The consensus was that the university IT governance process needs to focus on supporting the university mission and overall strategic plan. Guided by the IT Master Plan and building upon a structure that facilitates informed decision-making with limited bureaucracy, governance needs to foster stakeholder engagement, include cross-functional participation, and gain executive buy-in and support. The governance structure needs a consistent framework that is transparent to the university community and supports sustained communication and effective IT decision-making.

Key outcomes identified to inform the IT Master Plan:

- University-wide collaboration that aligns resource allocation with institutional priorities and maintains stakeholder engagement
- Governance is distinct from IT management. The function and process should enable entrepreneurship while acting as a facilitator more than a gatekeeper
- Effective engagement and communication are important in sustaining a governance structure that is adaptive, accountable, innovative, inclusive, sponsored by executives, understandable, and transparent

- Crafting and implementing buy-in, a strategic composition, and allowing for flexibility on the onset will help establish governance authority and credibility, developing a culture that benefits people who follow the process

Specific elements brought forth during the exercise:

- A project proposal process
 - Cyclical and interactive
 - Prioritizes meaningful IT projects and initiatives while enabling decision makers to gain broad input and make informed decisions
- Effective use of resources
 - Minimal complication and competition
 - Not bureaucratic
- Continued updates of the latest issues in higher education

Proposed governance model structure:

- Technical Advisory Committee (TAC) – Functions at a high level
 - Focuses on operational, academic, and business priorities at a high level
 - Institution wide perspective
 - May be chaired by CIO
 - CTO, faculty senate chair, CSUN president, GPSA president
 - Core group connected to Cabinet, Advancement, Decision Support, and General Counsel's office
- Technology Review Board (TRB)
 - More technical focus
 - Chaired by CIO
 - Includes college-level technology officers
 - Ad hoc teams
 - Proposals are delegated from TAC to TRB if they are deemed “small” projects (<\$50,000)
- Second-tier groups with specific technical focus
 - Application development
 - Security
 - Data governance
 - Services, operations, and infrastructure

Appendix D: Resource Considerations

The options provided are meant to be illustrative and not exhaustive.

Leverage and Consolidation

- *Software license consolidation and leveraging*
 - Recent examples of license consolidation at UNLV
 - lynda.com campus site license for online training resources for faculty, and staff - consolidated licenses in three different units into a single campus-wide site license
 - Qualtrics campus site license for a secure survey tool for students, faculty and staff - replaced faculty-only licenses in five different units and incorporated students into a single campus-wide site license
 - Recent examples of license leveraging across NSHE
 - Adobe licensing negotiations
 - Oracle licensing for both PeopleSoft and non-PeopleSoft products
- *Comprehensive contracts for equipment purchases*
 - CCS Presentations campus-wide contract for audio-visual related items – allowed entities from across campus to take advantage of competitively bid pricing established for an existing large project in central IT
- *Earlier consideration of competitive bids for technology purchases that are likely to reach campus purchasing limits within two years of first deployment*
 - Campus-wide request for proposal for digital signage solution - campus-wide approach allows digital signs (e.g., the new displays in the FDH lobby) to be used for campus-wide messaging (e.g., emergency notifications), makes support easier, and ensures competitive pricing for equipment and services

New Approaches for Providing Current Services

- *Hardware support from alternative sources*
 - Support for Sun equipment from a vendor other than Oracle - significant cost savings in hardware support costs
- *Virtualization*
 - Servers – maximizes use of costly data center space and improves availability to applications housed on the servers
 - Storage – maximizes use of costly data center space and makes it possible to consolidate storage needs across multiple applications at a significant cost savings
- *Evaluating the use of third party services that may be able to provide services in a more cost effective manner.*

- Online training services from lynda.com – using commercial services for training on a variety of commonly used software applications costs less than producing the training in house, helps keep the training current, provides just-in-time options for employee training, and frees up university training staff to develop training for software applications unique to UNLV

Strategic Use of Cloud Services

- *Migration of services to the cloud and/or new cloud services where appropriate*
 - Lotus Notes to Google Apps migration – reduces costs for email services, adds functionality and increases access options (Completed in 2015)
 - Office 365 for students – expands access to Microsoft productivity tools to all students (Completed in 2015)
- *Extend existing campus-based services through the use of cloud-based solutions*
 - Augment individual and shared storage needs currently met by systems on campus with appropriate storage options available through the cloud (e.g., DropBox, Redbooth, Box, Google Cloud Storage) – reduces costs, provides flexible alternatives to growing storage needs and, if brokered centrally on behalf of the entire campus, can ensure compatibility across units

Decommissioning Existing Services

- *Elimination of home grown and third party systems with the introduction of new enterprise systems*
 - Implementation of iNtegrate 2 – Depending on the solution selected, several current third party systems on campus will no longer be needed (e.g., MUNIS, iLeave) reducing costs associated with application support and maintenance of current integrations
- *Phasing out support for services with small numbers of users*
 - Decommissioning BlackBerry Server Services – After a peak of over 300, the number of individuals using the campus BlackBerry server dwindled to seven. The server was taken out of service in Spring 2014 for a cost savings of \$35,000 annually.

More Strategic Use of Existing Funding Sources

- *Conduct an annual internal review of central IT's budget to determine if savings can be created through process and technology changes within the organization.*
 - Determine what cost savings, if any, have accrued as a result of changes in internal processes and be deliberate about how cost savings are reallocated – ensures that costs savings are considered as a funding source for organizational and institutional priorities
- *Maintain a campus-wide prioritization of technology needs for submission to calls for use of one-time funds*
 - Keep the technology needs prioritization list current - makes it possible to respond to any type of funding request at any time with very short notice
 - Develop a list of technology equipment replacement needs based on established campus standards and prioritized across campus units - makes it easier to prioritize the technology

needs with the rest of the campus needs and allows for a systematic approach to meeting the equipment replacement needs

- *Include technology components in Major Capital Project renovation requests*
 - The recent request for renovation of the Carlson Education Building included provisions for network upgrades and wireless – helps keep technology current, reduces the need for more costly stand-alone construction projects to meet technology infrastructure needs
- *Partner with other campus entities on Annual Capital Improvement Fee Funds request submissions*
 - Consolidated requests for classroom improvement projects to include furniture, carpeting, paint and technology upgrades for audio visual equipment and wireless enhancements jointly proposed by the Executive Vice President & Provost and the Senior Vice Provost for Finance & Business for the 2014 funding cycle – maximizes the use of limited funds, reduces the procurement effort, reduces the time facilities are taken off line for improvements
 - Mapping and assessment of the campus cabling plant to be proposed jointly by Planning & Construction, Telecommunications, and OIT for the 2015 funding cycle - reduces duplication of effort, ensures that multiple needs for similar infrastructure are met, and raises the likelihood of securing funding
- *Consider using a bonding option for large, multi-year technology projects; option requires an identified revenue source for repayment (e.g., new fee)*
 - Additional new technology equipment and replacement of aging equipment in Greenspun building initially purchased with building funds – allows for multi-year projects too small for Major Capital Projects and out of scope for Annual Capital Improvement Fee Funds

Reallocation of Existing Revenues

- *Allocate a small percentage of indirect cost returns for technology improvements specifically geared to supporting the research infrastructure*
- *Repurpose funds gained from costs savings due to changes in processes, decommissioning, moving to third party service providers, etc.*

Additional Cost Recovery Rates for IT Services

- *Strategically determine the addition of cost recovery rates for a select number of technology services*
 - Cost recovery rates for data center usage and server hosting services – ensures that the units using the services are paying for those services, allows for recharge to federal grants
 - Clearly articulated cost recovery charges for use of services that exceed the norm (e.g., charges for requests for data storage beyond allocated quotas) – ensures that those who need more than the allotted share of campus services can obtain those services in a seamless fashion, distributes costs in a fair fashion, incentivizes review of resource needs, and rewards clean up efforts

Strategic Spending

- *Use systematic equipment refresh programs to reduce costly support of end-of-life operating systems and repair of equipment out of warranty and/or no longer supported by the manufacturer*

- *Provide regular reports about anticipated new technologies planned for the campus with time tables and purchasing recommendations for preparing for the new technologies*
 - Migration to the cloud for several campus services – reduces the need for high-powered desktops, increases the need for lean laptops, tablets and mobile devices, and requires more wireless connectivity in office environments
- *More strategic use of student employment opportunities in centralized and distributed IT units*
 - Graduate assistantships assigned to IT units for students interested in IT careers
 - Graduate assistantship assigned to academic units to support students in IT-related degree programs
 - Public Service Intern positions to support internship requirements in academic units
 - Student employment positions to support undergraduate and graduate students

New Revenues

- *Consider increasing the Student Technology Fee (\$4.00 per student credit hour fee was instituted in January 2000 and has not been raised). Considerations should include a cost analysis of current Student Technology Fee expenditures and a spending plan that demonstrates that new revenues would meet the requirements established when the fee was initially approved.*
 - Cover raising staff and operating expenses
 - Support increased use of technology resources for learning in and out of the classroom
- *Pursue grant funding for new strategic initiatives that have a large technology component*
 - Support blended learning projects
 - Provide resources for analytic tools and staff services for data-based decision-making regarding retention, progression, and completion

Maximizing Technology and Community Partners

- *Data Center services community partnership*
 - UNLV IT Master Plan includes an action item to move select server and storage hardware to an off campus data center (e.g., Switch) – provides data center service expansion at a lower cost than constructing additional facilities on campus
- Pursue opportunities with technology partners for grant funding, donated equipment, and/or services
- Taking advantage of discount pricing negotiated by national IT non-profit organizations (e.g., Internet2, EDUCAUSE)

Appendix E: IT Service Management Background

ITIL. The Information Technology Infrastructure Library¹ (ITIL) is widely adopted in the higher education community. ITIL provides a framework for managing and delivering IT services that describes Information Technology Service Management as a process-based practice intended to align the acquisition, delivery, use, and support of technology services with needs of the enterprise, emphasizing benefits to users.

IT Service Catalog. Campus Technology has described an effective service catalog as a tool that serves multiple roles: to steer users to the appropriate resource, to communicate to the campus what technology service providers do, and to help technology service providers stay within their own capabilities.²

Service attributes. Each service in the catalog will be assigned attributes that enable users to navigate to the appropriate services based on needs. The following list contains a preliminary set of attributes:

- Service Cost – Baseline (no charge), contractual, and fee-for-service
- Consumer – Student, Faculty, and Administrative
- Service Type – Applications, Professional, Hosting/Network, Desktop Support, Security, Conferencing, and Telecommunications

Individual services will have dedicated pages that describe the service in a similar format and provide a direct link for initiating a service request ticket or contacting the service owner for additional information. Each service page will include the following elements:

- Service Name
- Service Type – See Service Type categories listed above
- Consumer – Users offered the service
- Description – High level overview of the service
- Cost – See Service Cost categories listed above. If fee-for-service, specify pricing.
- Service Owner – Who is responsible for managing this service? In some cases, this will not necessarily be the individual who provides the service.
- Direct Link/Self-Service – A hyperlink that initiates an email to the service owner, or, if applicable, initiates a support ticket that is routed directly to the appropriate queue.
- Feedback – A web form that allows individuals to provide service feedback to the service owner. This feedback will also be collected and summarized for review by the technology governance committees.
- Other relevant information – May include a link to a knowledge base, frequently asked questions, a sample service level agreement, or the service provider's website.

¹ The Information Technology Infrastructure Library (ITIL) is a set of practices for IT service management (ITSM) that focuses on aligning IT services with the needs of business. The names ITIL and IT Infrastructure Library are registered trademarks of the United Kingdom's HM Government, which is part of the Cabinet Office.

² Campus Technology. Secrets of the Service Catalog. <http://campustechnology.com/articles/2011/09/01/secrets-of-the-service-catalog.aspx>

Appendix 1A: UNLV Information Technology Governance Group Membership and Charges

The Information Technology Governance Structure

The information technology governance structure includes a newly created Chief Information Officer (CIO) position. As a key member of the governance structure, the CIO is responsible for convening and facilitating the work of two complementary groups that serve distinct roles in supporting technology governance – the Technology Advisory Committee (TAC) and the Technology Review Board (TRB). Additionally, standing campus technology groups provide subject matter expertise and assist with TAC and TRB committee charges.

Technology Advisory Committee

Purpose of Group

The Technology Advisory Committee is comprised of campus representatives with institutional perspectives on academic, student-related, research, operational, and administrative priorities. The primary responsibilities of the group are to:

- Establish a technology vision and set priorities that align with and help meet university strategic goals
- Advise the President's Cabinet on matters related to technology projects, budgeting, and planning
- Prioritize and approve major technology investments
- Optimize and protect information technology assets
- Provide leadership and planning for the thoughtful exploration of emerging technologies

Reporting Structure

Reports to the President's Cabinet through the Chief Information Officer

Membership

Areas Represented	Members
Campus Technology	Chief Information Officer, Chair
Executive Vice President & Provost	Executive Vice President & Provost or appointee
Finance & Business	Senior Vice President for Finance & Business or appointee
Student Affairs	Vice President for Student Affairs or appointee
Research & Economic Development	Vice President for Research & Economic Development or appointee
Advancement	Senior Associate Vice President University Marketing, Communications, and Brand Strategy
Academic Dean	Council of Dean's appointee
Faculty	Faculty Senate Chair or designated appointee
Central IT	Vice Provost for Information Technology (Ex-Officio)

Charges

- Maximize the campus IT investment through the allocation of resources that:
 - Support Top Tier and Retention, Progression, and Completion strategic initiatives
 - Anticipate future campus technology directions
 - Build and sustain an adaptable IT foundation
 - Facilitate access to and use of campus data
 - Promote innovation
- Optimize central, distributed, and outsourced IT resources
 - Recommend to Cabinet major organizational restructuring to maximize IT resources
 - Oversee the IT Services Portfolio
 - Approve major changes to the IT Services Catalog
 - Strengthen collaboration within the IT Community at UNLV
- Maintain the campus IT Project Portfolio
 - Prioritize major campus IT projects
 - Approve major IT projects and secure funding
- Maintain a list of IT priorities for submission through the Major Capital Project and One-Time Project Process and other campus calls for funding needs
- Review and approve plans to mitigate IT security risks identified by the Technology Review Board
- Implement and oversee the strategic technology planning cycle
 - Ensure the strategic technology plan is updated annually
 - Update plan initiatives to maintain alignment with campus strategic directions
 - Identify annual goals and secure resources to meet plan initiatives
 - Assess progress on annual goals and overall plan initiatives
 - Involve campus community in planning and assessment
- Provide transparency regarding IT priorities and decision-making
 - Regularly update the campus community on IT priorities and progress on initiatives
 - Develop easy-to-use mechanisms for participating in planning activities, requesting projects and/or new services, providing feedback, assessing progress, etc.
 - Ensure information about technology services and support is readily available and understandable
 - Create communication venues tailored to meet the needs of audiences varying in technical knowledge
- Provide direction to and act on recommendations from the Technology Review Board
- Identify emerging technologies and their impact on higher education in general and UNLV specifically
- Promote activities that encourage understanding and adoption of new technologies
- Provide the Cabinet an annual assessment of the performance of the TAC in fulfilling these charges

Each initiative in the UNLV IT Master Plan provides additional guidelines for fulfilling these charges.

Technology Review Board

Purpose of Group

The Technology Review Board is comprised of technology specialists from across the campus. The primary responsibilities of the group are to:

- Provide coordinated IT services designed to support both individual needs and campus strategic directions
- Create and maintain a secure, adaptable, cohesive campus-wide core technical environment that optimizes UNLV's ability to adapt quickly to current and future opportunities
- Serve as the technical advisory group for the Technology Advisory Committee (TAC)
- Liaison with standing and ad hoc campus and Nevada System of Higher Education technology groups

Reporting Structure

Reports to the Chief Information Officer

Membership

Technical Staff Representing the Following Areas	Appointed By
Cabinet (1) • Chief Information Officer, Chair	President
Academics (4)	Executive Vice President & Provost
Research (2)	Vice President for Research & Economic Development
Academic Health Center (1)	Dean of UNLV School of Medicine
Administrative Units (3) • Finance & Business • Student Affairs • Advancement	Appropriate Cabinet Member
UNLV Technical Staff (1)	IT Forum Group (appointee should be a non-Central IT member of the group selected by election)
Faculty (1)	Faculty Senate
Online Education (1)	Vice Provost for Academic Affairs
Institutional Analysis & Decision Support (1)	Associate Vice Provost for Institutional Analysis & Decision Support
UNLV Libraries (1)	Dean of UNLV Libraries
Graduate Students (1)	Graduate and Professional Student Association (GPSA) President
Undergraduate Students (1)	Consolidated Students of the University of Nevada, Las Vegas (CSUN) President
Central IT (2)	Chief Information Officer

Charges

- Regularly review and update the campus IT Service Catalog
 - Ensure IT services are usable, customer friendly, and seamless
- Provide a forum for discussion and resolution of IT service issues
- Review and recommend changes to the enterprise IT architecture
- Develop and maintain a list of approved standards for campus technologies. Examples of areas where standards already exist or need to be developed include:
 - Desktops
 - Mobile devices
 - Printers
 - Security including access and identity management
- Create and update campus policies to optimize the IT environment. Initial needs for policy development identified in the IT Master Plan include:
 - IT Purchasing (e.g., standards-based, leveraging)
 - Deploying applications requiring use of enterprise data
 - Mobile application coordination
- Prepare technical reviews of major IT projects (1,000 hours or more) to be considered by the Technical Advisory Committee. Reviews should include information such as:
 - Architectural fit
 - Data considerations
 - Security
 - Resource needs
 - Support
 - One time and ongoing costs
- Recommend to the Technology Advisory Committee IT security and IT infrastructure project priorities
- Create and implement a process to prioritize and approve mid-sized (300 hours) IT projects (e.g., modifications to MyUNLV, add-ons to WebCampus, standardizing printers)
- Review and approve annual reports and act upon recommendations from standing and ad hoc campus technology groups. Examples of proposed reports from the IT Master Plan include:
 - Security risk assessment and mitigation report created annually by the Cyber Security Team
 - Annual progress on the implementation of the UNLV mobile strategy
- Foster the relationship with System Computing Services (SCS)
 - Ensure SCS is aware of campus initiatives that will impact SCS services
 - Ensure the campus is aware of SCS initiatives that will impact campus services
- Review technology trends and make recommendations for:
 - New technology projects and services in light of campus strategic directions
 - IT purchasing standards that anticipate future technology
 - Minimum technology qualifications for new hires and employee development programs
- Provide an annual assessment to the TAC of the TRB's performance in fulfilling these charges

Each initiative in the IT Master Plan provides additional guidelines for fulfilling these charges.

Escalation

Unresolved issues will be escalated to the TAC as needed.

Standing Campus Technology Groups**Proposed in IT Master Plan**

Cyber Security Team

Research Technology Group

Existing

Mobile Application Coordination Group

Faculty Technology Advisory Board

Student Technology Advisory Board

Learning Management System Coordinating Committee

Appendix 3A – General CIO Responsibilities

General CIO Responsibilities

- Leads high profile technology initiatives that require executive leadership
- Sustains positive and productive relationships within the State of Nevada, with regional and national organizations, and among state and federal agencies
- Collaborates with students, faculty, administration, staff, and other stakeholders
- Participates actively as a member of the university's executive management team
- Leads centralized and distributed members of the university's IT Community
- Communicates to the campus and the university IT community regarding technology services
- Leads prioritization of IT systems and projects, gathering input, and sharing outcomes broadly
- Develops and manages the annual operating and project budgets for IT
- Promotes continuous improvement and professional development of IT staff
- Recruits, motivates, and develops a high-performing team of highly qualified IT staff
- Continuously evaluates opportunities to leverage UNLV's buying power
- Plays a role in national organizations and initiatives as appropriate (EDUCAUSE, Internet2, etc.)

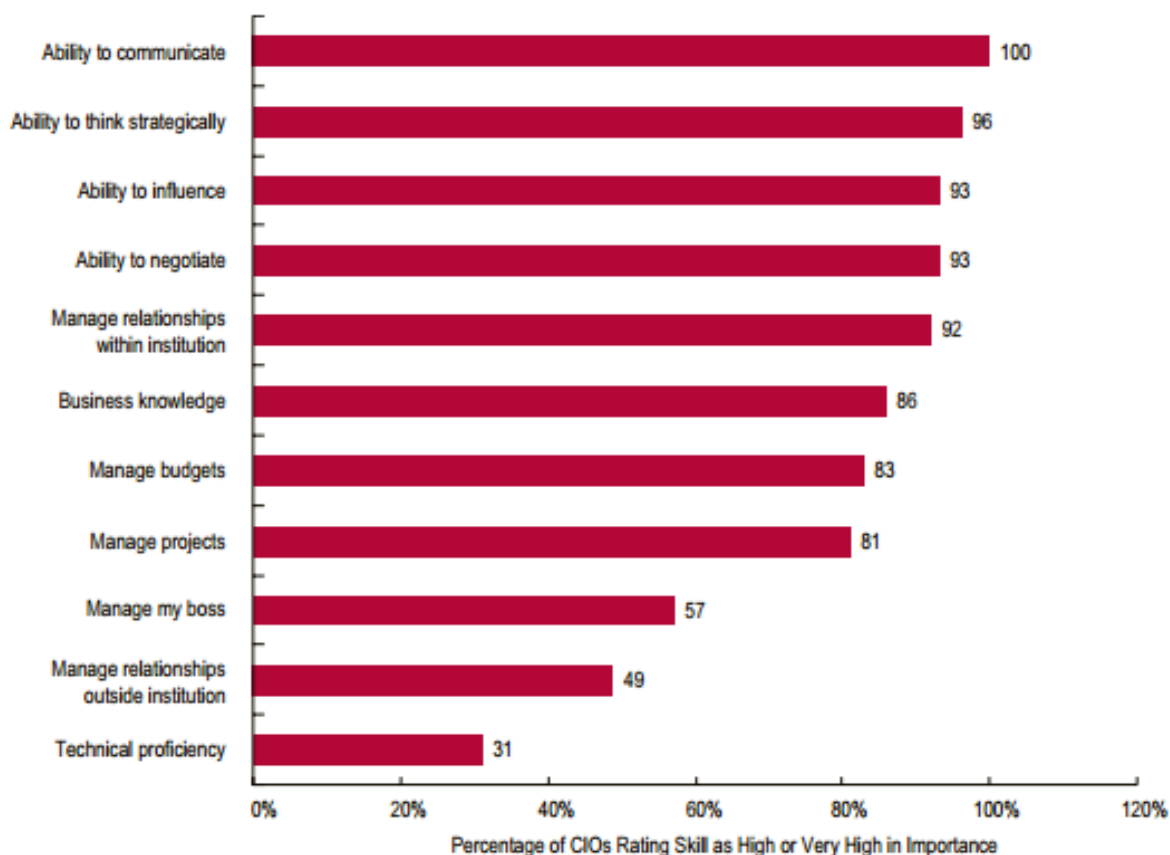
Competencies Expected

The CIO will be an IT leader with a deep understanding of present technology and a sophisticated grasp of the future of information technology in higher education. This leader will need to implement the IT Master Plan and to change the culture of IT at UNLV. The CIO needs to possess the following core competencies:

- **Leadership:** This CIO will be an outstanding communicator who can build credibility with the senior leadership team, the various constituent groups at the university including students and faculty, and other IT teams throughout the university and from key national organizations
- **Collaborative Spirit:** This individual has the ability to work collaboratively and effectively in a shared governance environment with faculty and staff members from a range of disciplinary backgrounds
- **Integrity:** The successful candidate possesses and can demonstrate a consistent record of personal and professional integrity and good professional judgment
- **Proactive:** This insightful leader will actively seek new opportunities to advance the institution's reputation and identify and address issues before they become major problems
- **Relationship and Team Builder:** This person values networking and teamwork and has proven ability to develop relationships with multiple constituencies both internal and external to the organization
- **Strong Execution Mindset:** The CIO must drive agile execution of day-to-day operations and continuous improvement initiatives, along with management of critical projects and programs
- **Communicator:** The CIO must clearly communicate the implications of technological trends to university leadership, faculty and staff

Abilities Needed for a University-wide CIO

A 2011 CIO study performed by the EDUCAUSE Center for Analysis and Research (ECAR) used survey feedback from IT leaders across 900 institutions to identify the qualities that have the greatest impact on CIO success. The following figure provides an overview of CIO responses in ranking of these qualities.



Appendix 4A – UNLV IT Project Review Process

Process Owner

Chief Information Officer or designee

Purpose

An effective IT project review process at UNLV should:

- Maximize IT investments by selecting and prioritizing the optimal combination of projects to meet the university's strategic goals.
- Ensure that the degree of review, approval, and monitoring is consistent with the size and scope of the project.
- Provide a high-level view of the status of all campus IT projects (e.g., requested, pending, approved, completed) to inform university planning, collaboration, and decision-making.
- Balance the needs for new services, service enhancements, innovation, security, and a robust infrastructure.
- Build interoperability, security, data management, and usability into the IT project review process.
- Coordinate the IT project review process with the IT purchasing approval process.
- Make optimal use of outsourcing, economies of scale, and existing resources.
- Address both campus-wide and unit-specific IT project and IT purchasing needs.
- Utilize transparent and easy-to-follow processes for requesting approval and tracking projects.
- Be expeditious and not impede effective service delivery.

Combining the project and purchasing review processes will increase the value of IT purchases by creating a dialogue with a wider group of IT professionals who may help address needs that might not have been considered by a single individual or unit. The processes will also identify possibilities for integrations with existing systems that could significantly enhance the functionality of the purchase.

The Need for Project Intake and Tracking

The current environment. UNLV staff resources are rarely dedicated to a single project and typically share both project and operational responsibilities. This structure, typically characterized as a “weak matrix” organization, allows flexibility in deploying resources but presents significant challenges in coordinating those resources for efficient and predictable project delivery. These dual responsibilities also affect the university's ability to deliver sufficient operational support and enhancements for current and new applications.

Project intake. It is recommended that UNLV create a single project intake process to track all IT projects. A single process provides the clearest picture and most effective management of IT resources, while ensuring the university's IT investment is aligned with strategic priorities.

The presentation of a business case is recommended for all projects regardless of size. After intake, projects can be routed for review. Additional details may be required based on the size and scope of the request. The information necessary to effectively fulfill and manage a project request should match the size, cost, and complexity of the project.

A tool for tracking. A project portfolio management (PPM) tool is essential to provide a transparent IT project request process and expeditiously manage the flow of information needed for decision-making. Project portfolio management tools provide the structure to manage project delivery and estimate resource availability.

The benefits. By using a single intake process for all projects, UNLV can better manage IT resources and ensure that the IT investment is aligned with strategic priorities.

The IT Project Approval Process

Four project approval paths with a review levels, approvals, and monitoring consistent with the size and scope of the project are recommended. The four project approval streams would be managed using four distinct portfolios.

1. Major IT Initiative Portfolio
2. Foundational IT Portfolio - Security and Infrastructure Programs
3. Mid-Size IT Project Portfolio
4. Enterprise IT System Enhancement Portfolio

More detailed information on each of the project approval streams is provided in the table below. The group governing project approval will determine the information and documentation required to review and manage projects in its portfolio stream.

Table 4A-1: Characteristics of the UNLV IT Project Portfolios

1. Major IT Initiative Portfolio		
Criteria for Project Inclusion in Portfolio	<ul style="list-style-type: none">▪ Cost over \$100,000 or use over 1,000 staff hours▪ NSHE system-wide projects (e.g., the iNtegrate 2 project detailed in Initiative 9)	
Exceptions	<ul style="list-style-type: none">▪ Grant-funded research projects are not included in the Major IT Initiatives Portfolio unless they require significant enterprise IT resources▪ IT infrastructure projects are prioritized in a separate portfolio▪ IT security projects are prioritized by subject matter experts in a separate portfolio	
Prioritization Criteria	<ul style="list-style-type: none">▪ Value of investment in achieving the university strategic goals▪ Resource requirements	
Project Approval	<ul style="list-style-type: none">▪ Technology Advisory Committee (TAC) with technical input from the Technology Review Board (TRB)	
2. Foundational IT Portfolio - Security and Infrastructure Programs		
	Security Program	Infrastructure Program
Criteria for Project Inclusion in Portfolio	<ul style="list-style-type: none">▪ Primary objective of the project is to mitigate an identified risk to university systems or data▪ Designed to proactively improve university security	<ul style="list-style-type: none">▪ Primary objective of the project is to enhance university infrastructure to better support IT services▪ Replacement of end-of-life infrastructure services

	<ul style="list-style-type: none">▪ Addresses a security audit or compliance recommendation▪ Improves the usability or functionality of university security systems▪ Addresses audit or compliance requirements	
Exceptions	<ul style="list-style-type: none">▪ Grant-funded research projects	<ul style="list-style-type: none">▪ Grant-funded research projects
Prioritization Criteria	<ul style="list-style-type: none">▪ Mitigates an identified risk to university systems or data▪ Addresses audit or compliance▪ Improves usability or cost-effectiveness or existing security systems	<ul style="list-style-type: none">▪ New system requirements▪ Improves usability, security, or adds features required to deliver existing or support planned IT services
Project Approval	<ul style="list-style-type: none">▪ UNLV Cyber Security Team prioritizes initiatives that are approved by the Technology Review Board (TRB)	<ul style="list-style-type: none">▪ Technology Review Board (TRB) prioritizes and approves initiatives, with oversight by the Technology Advisory Committee (TAC). TRB bi-annually reports to the TAC on the priorities, impact, cost, and scheduling of planned infrastructure projects
3. Mid-Size IT Project Portfolio		
Criteria for Project Inclusion in Portfolio	<ul style="list-style-type: none">▪ Cost between \$25,000 and \$100,000▪ Requires between 300 and 1,000 UNLV staff hours	
Exceptions	<ul style="list-style-type: none">▪ Grant-funded research projects▪ IT infrastructure and Security Projects▪ Enhancements to a single existing enterprise system with its own governance group and requiring less than 300 hours to complete	
Prioritization Criteria	<ul style="list-style-type: none">▪ Value of Investment in achieving the university strategic goals▪ Availability of resources	
Project Approval	<ul style="list-style-type: none">▪ Technology Review Board (TRB) with oversight by the Technology Advisory Committee (TAC)	
4. Enterprise IT System Enhancement Portfolio		
Criteria for Project Inclusion in Portfolio	<ul style="list-style-type: none">▪ Minor modification to one of the university's large enterprise systems (e.g., MyUNLV, iNtegrate 2, WebCampus) that have dedicated staff resources and an established governance process to support system enhancements▪ Minimal impact to other systems or services▪ Requires less than 300 hours of staff time to implement enhancement	

Exceptions	<ul style="list-style-type: none"> ▪ Modification creates a redundant service. TRB will review changes that add a service already provided by another system in the IT Service Catalog ▪ Modification significantly changes the way data are being stored or secured ▪ Requires the procurement of a product(s) totaling over \$25,000
Prioritization Criteria	<ul style="list-style-type: none"> ▪ Compliance with government or security regulations ▪ Restores functionality lost in service changes ▪ Provides functionality to support RPC or Top Tier initiatives ▪ Improves usability, security, or adds features required to improve existing or support planned IT services
Project Approval	<ul style="list-style-type: none"> ▪ The IT governance team responsible for the service

Including NSHE IT Projects in the UNLV Major IT Initiatives Portfolio

NSHE system-wide projects (e.g., the iNtegrate 2 project detailed in Initiative 9, major wide-area network upgrades) are approved and managed in coordination with other NSHE institutions. These large NSHE-wide initiatives often come with dedicated resources but typically require significant campus-based resources beyond those dedicated to the project.

While approval and management of these projects is outside the scope of the UNLV IT project review process, it is recommended that the campus projects in support of NSHE enterprise projects be included in the IT Major Initiative Portfolio. Creating a link between NSHE projects and the UNLV IT project portfolios allows the university to properly account for the resource requirements and impact of implementing NSHE initiatives.

Appendix 5A – Developing the IT Service Portfolio & the IT Service Catalog

The IT Master Plan recommends improving IT service coordination at UNLV through the development of both an IT Service Portfolio and an IT Service Catalog. Together the portfolio and the catalog will provide the campus with a clear picture of what IT services exist, what new IT services are being planned, how to access the services, and who is responsible for providing the services. Below find details about the IT Service Portfolio and the IT Service Catalog, how they would be developed and maintained, as well as examples of how they would be used and why they are needed.

The IT Service Portfolio

Functions of an IT Service Portfolio

- Serves as a tool for managing service delivery from initial implementation to retirement
- Is used as a reference when making decisions regarding staffing and resource allocation
- Provides a baseline for technology governance decisions that relate to technology services

Contents of an IT Service Portfolio

- A complete listing of existing technology services including:
 - Services that are highly visible to the customer (e.g., establishing a login to a desktop computer)
 - Service components customers may not be aware of that are part of the services they use (e.g., ensuring the information on the computer is automatically backed up)
- High-level information about services including:
 - Current list of existing services
 - Data about new services under consideration
 - Planning details related to service improvement initiatives
 - Schedules for decommissioning existing services
- Service level agreements (SLAs) between units that together provide a complex service (e.g., MyUNLV)
- Information about third-party services that augment services provided by the university (e.g., data center services from System Computing Services)

Responsibilities for Managing UNLV's IT Service Portfolio

Individual or Group	IT Service Portfolio Responsibilities
Chief Information Officer (CIO)	<ul style="list-style-type: none"> • In collaboration with TAC: <ul style="list-style-type: none"> ○ Initiate development of the portfolio ○ Oversee ongoing maintenance of the portfolio • Engage governance groups to ensure campus-wide inclusion of IT services in the portfolio
Technology Advisory Committee (TAC)	<ul style="list-style-type: none"> • In collaboration with CIO: <ul style="list-style-type: none"> ○ Initiate development of the portfolio ○ Oversee ongoing maintenance of the portfolio • Approve changes to the portfolio • Conduct periodic reviews of the portfolio to ensure the IT services continue to meet individual and campus needs

Individual or Group	IT Service Portfolio Responsibilities
Technology Review Board (TRB)	<ul style="list-style-type: none"> Recommend changes to the portfolio to the TAC

The Service Catalog

Functions of an IT Service Catalog

- Indicates which strategic goal or business need is supported by a particular IT service
- Identifies the campus personnel and/or unit responsible for delivering each service in the catalog
- Provides customers with information about available IT services and how to access them
- Enables and automates the IT service request process

Contents of an IT Service Catalog

- A list of all current services presented in a manner that enables users to easily browse, select, and initiate requests for services
- An external facing presence that describes services intended for customers. Each service within the catalog includes information such as:
 - A description of the service
 - Timeframes to fulfill a service request once initiated
 - Any related service level agreements for fulfilling the service
 - Who is entitled to request/view the service
 - Costs (if any)
 - How to request the service
 - Escalation points and key contacts
 - Hours of service availability
- An internal facing component that helps service providers respond to service requests. Each service within the catalog includes information such as:
 - Documentation for the procedures and processes required for completing service requests
 - Detailed technical attributes of the requirements for delivering the service
 - A list of all systems needed to fulfill the request
 - All service level agreements between all units responsible for offering complex services
 - List of contacts supporting each component of the service

Responsibilities for Managing UNLV's IT Service Catalog

Individual or Group	IT Service Catalog Responsibilities
Chief Information Officer	<ul style="list-style-type: none"> In collaboration with the TAC: <ul style="list-style-type: none"> Initiate development of the catalog Oversee ongoing maintenance of the catalog Facilitate periodic service catalog updates with service owners
Technology Advisory Committee	<ul style="list-style-type: none"> In collaboration with the TRB <ul style="list-style-type: none"> Initiate development of the catalog Oversee ongoing maintenance of the catalog

Individual or Group	IT Service Catalog Responsibilities
	<ul style="list-style-type: none"> • Approve major changes to the catalog • Review statistics and assess feedback related to the catalog
Technology Review Board	<ul style="list-style-type: none"> • Review requests from campus constituents about changes in IT services • Recommend to the TAC new services, changing services, and services to be retired

Example of the Type of Information Found in an IT Service Catalog

The scenario - A new campus employee needs wireless access.

The external facing portion of the catalog would provide the employee information such as:

- Who to contact to get the access
- The fee for the service, if any
- Who can access the service
- What transmission speeds to expect
- How long establishing an account should take
- When and where wireless access is available
- Links to documentation on how to configure and use the service

The internal facing portion of the catalog would include information that the unit(s) providing the service would require, such as:

- A map of current wireless coverage
- Details about setting up the authentication process for the customer
- Questions to ask to determine if the customer's devices (e.g., computer, tablet, phone, etc.) will support wireless connectivity
- Who to contact for more details about authentication, campus hot spots, etc.

Creating Service Level Agreements (SLAs)

The more complex IT services at UNLV will require agreements between two or more UNLV or external entities who, together, provide the complete service (e.g., various services offered by MyUNLV involve staff from Student Affairs, Controllers Office, Institutional Analysis and Decision Support, OIT, and System Computing Services). To ensure all units involved in providing a service are aware of the expectations of their units, Service Level Agreements that set forth formal terms for service arrangements need to be developed. SLAs will differ by service but will contain information such as:

- Description of the service to be provided by each unit
- Number and type of staff resources and amount of time required for the service
- Service availability expectations
- Response time expectations for service disruptions
- Communication channels and issue escalation procedures
- Assessment mechanisms to evaluate the effectiveness of the agreement
- Penalties and contract back-out options

Adding, Changing, or Eliminating IT Services

A process for requesting changes to the IT Service Portfolio will need to be developed. The process should include the following steps:

- Assess need and impact of a new service or change to an existing service
- Determine the scope of the service
- Identify the delivery methods
- Map the interdependencies with other services in the catalog
- Decide upon centralized, decentralized, outsourced, or hybrid delivery
- Define resources required to support new or changed services
- Communication with the stakeholders most impacted by the service throughout the process

An Example of Current UNLV IT Services that Would Benefit from Campus Coordination

OIT is currently defining a set of services that would benefit from a structured, campus-wide approach to creating IT Services associated with a full-service data center. The services include:

- Server hosting at OIT data center facilities
- Application hosting on virtualized servers managed by OIT
- Provisioning data storage and related services associated with the applications on OIT hosted servers

Other units on campus offer similar services (e.g., Supercomputer Center) or related services (e.g., Library). The coordination between the units is done informally and makes it difficult for campus clients who need the services to know which unit offers which services.

Furthermore, OIT only offers one type of data storage for the servers it supports. To better serve customers and minimize costs, data storage services need to be differentiated by factors such as:

- Type of access - shared or not shared, publicly available or not
- Amount of access - use every day, access once a month, rarely viewed archival records
- Security requirements - normal, high, classified
- Special considerations - data cannot be stored out of the country; data cannot be stored in the cloud

UNLV should determine which units are best at storing which types of data (e.g., Supercomputing Center for classified data, Library for institutional archives) and provide campus clients with a coordinated set of storage options.

Appendix 5B – List of Common Good Services at University of Minnesota

The University of Minnesota uses a logical screening process for determining which services are best provisioned by central IT and which services are best provisioned by distributed IT. Below is a list of the Common Goods Services offered by the OIT at the University of Minnesota.

52 Common Good Services and Counting

<i>Business Applications</i>	<i>Infrastructure</i>	<i>Faculty, Staff, and Student Support</i>
<ul style="list-style-type: none"> • Address verification tool • Campus solutions (PeopleSoft) • Database • Data warehouse • Electronic research database • Financial system • Student internship and career service portal • Graduate planner • HR System • Imaging • Library automation • Course management system • Electronic portfolio • Academic survey tool • Web statistics • Virtual server hosting • Web hosting • Course management software 	<ul style="list-style-type: none"> • Authentication services • Computer recycling • Data centers • Directory services • Enterprise document management system • System status dashboard 	<ul style="list-style-type: none"> • Active directory • Screen capture • Computer labs • Consultation services • Emerging academic technology services • Evaluation and research services • Faculty development programs • Help desk • iTunes U • Media services • Security services • Software licenses • Technology training • Technology procurement portal • Usability services
<i>Communications</i>	<i>Productivity Applications</i>	
<ul style="list-style-type: none"> • Data network • Voice services 	<ul style="list-style-type: none"> • Data back ups • Calendar • Email services • Enterprise storage • Google apps • Web portal • NetFiles • Chat • Web conferencing • Web content management system • Wiki 	

Source: Common Good Services 2010, University of Minnesota, Office of Information Technology; Education Advisory Board interviews and analysis.

Appendix 6A – Building a New Model for Sustaining IT Investments

Components of a new model for sustaining IT investments include:

1. Technology standards that:
 - Help UNLV choose technology that works well with existing systems
 - Enhance service provision by reducing variability
 - Allow UNLV to broker contracts for preferred vendor pricing
 - Ensure that evolving information technology security requirements are addressed
2. Regular assessments of UNLV's IT investments to:
 - Identify technologies that need to be decommissioned
 - Determine when fundamental infrastructure needs to be re-architected
 - Pursue opportunities for consolidation of technology investments
 - Determine when to adopt emerging technologies
3. Funding models that:
 - Address the shared and unique needs of UNLV's distributed and central IT environments
 - Optimize technology refresh programs throughout the institution
 - Anticipate the costs associated with major shifts in the provision of infrastructure services
 - Account for maintenance and renewal costs of grant-funded equipment used to provide on-going university services

1. Adhering to technology standards. The campus currently has IT standards for the purchase of desktop and laptop computers and a contract in place for a single vendor for campus cell phone devices and services. Additionally, for economies of scale, compatibility, and consolidation of skills needed for management, central IT uses a primary manufacturer for servers and one for network equipment. More must be done to establish additional standards that would reduce the number of vendors providing supported devices (e.g., printers). New standards will also optimize purchasing power and lead to better service provision. Ensuring adherence to technology standards through appropriate policies and approval procedures will also make it more likely that newly acquired technology will integrate well with the broader enterprise system environment.

To ensure that campus IT investments are keeping pace with anticipated need and reflect changing campus strategic directions, the Technology Review Board (TRB, see Initiative 1) is responsible for developing new and maintaining existing campus technology standards. The group will also set appropriate thresholds for applying the standards, work with the Purchasing Office to set up commodity approval processes, and establish exception procedures. The TRB is also responsible for reviewing and recommending changes to the enterprise IT architecture and will be in a position to adjust campus standards as the IT environment continues to evolve.

To realize the benefits of technology standards, new policies and procedures regarding the purchasing of IT applications, equipment, and services must be established (see Initiative 4). To meet the unique needs that will arise across the campus community, exceptions to the technology standards and to the purchasing policies and procedures will need to be granted. Exceptions will be considered carefully as they diminish the benefits associated with establishing standards and often require additional administrative and management oversight.

Furthermore, continually evolving information technology security requirements will impact technology standards. In order to mitigate new risks the TRB will work with the campus Cyber Security Team (see Initiative 8) to stay abreast of changes in the security landscape that require adjustments to campus technology.

Finally, UNLV must strive to maintain an optimal balance between organizational effectiveness and individual preferences. Individuals need to acknowledge that the university cannot support every available technology.

2. Assessing the IT investment. Regular assessments of IT investments will help determine when to decommission a service, when to consolidate services that are being offered by multiple units on campus, and when to introduce emerging technologies.

Decommissioning - Once IT services are included in the IT Services Catalog (see Initiative 5), periodic review of the IT investments associated with those services will reveal changes in usage, which in turn will trigger a timely decommissioning. Even before a technology becomes obsolete it may need to be decommissioned. When multiple technologies provide similar services or when newer technology is needed to integrate better with newly implemented applications, decommissioning should be considered.

Advancing the infrastructure - Sustaining the IT environment is broader than replacing aging equipment. The underlying technology infrastructure (e.g., server and application management, storage services, database management, data center services) must also continually be updated to accommodate new approaches to providing infrastructure services. In the next four to six-year period, UNLV will need to leverage:

- A. Virtualization (i.e., the ability to provide technology services independent of specific hardware).
 - a. Implement virtual desktop environments customized for specific roles within the university (e.g., a cashier's desktop would be different than one used by an administrative assistant in athletics)
 - b. Deliver virtual applications that provide access from anywhere on any device (e.g., provide students virtual access to software currently only available in campus computer labs)
- B. Private Cloud Infrastructure Services (i.e., UNLV managed resources available through self-service web-based interfaces)
 - a. Develop a self-service method to access and/or install commonly used applications licensed for use at UNLV
 - b. Deploy new servers and/or databases through a self-service interface (e.g., faculty member able to deploy a web server for a class project with very little advance preparation time)
- C. Cloud Services (i.e., software applications available through web-based interfaces)
 - a. Replace legacy human resources and financial management systems with cloud-based applications (e.g., Workday- see Initiative 9)
 - b. Introduce new cloud-based web-conferencing tools (e.g., Blue Jeans, WebEx see Initiative 14)
 - c. Maximize cloud-based collaboration applications (e.g., Google App for Education)

D. Off-site Data Center Services (i.e., off campus server and storage hosting)

- a. Provide high availability business continuity and disaster recovery capabilities to protect university data and information services
- b. Leverage partnerships with infrastructure providers to adapt more quickly to changing technologies

New infrastructure services will also require a more robust set of management tools and methodologies. UNLV will need to invest in:

- Enterprise process management to allow for precise control of scheduled activities
- Database replication tools for backup, automatic recovery, workload distribution, etc.
- Security and auditing tools to protect the integrity of UNLV's systems and data
- Enterprise application integration tools to streamline communication between interacting systems

Consolidating - One of the many strengths of a distributed IT environment is the ability to adopt new technologies for unit-specific needs very quickly. The technology deployments often fall below purchasing thresholds requiring a bid process and many new technology services are offered as software-as-a-service so no hardware infrastructure is needed. Occasionally, more than one unit will adopt the same technology.

With assistance from UNLV's Purchasing Office, the IT investment assessment effort will include a periodic review of technology purchases across the campus to discover the technologies being adopted by multiple units across campus (see Initiative 4). The assessment will determine when purchases of the most commonly used technologies can be consolidated to leverage better pricing and, if appropriate, some centralized IT services (e.g., login and password management for software applications). Additionally, the UNLV representatives on the NSHE System-Wide Software Committee could use the information gleaned from the periodic assessments to determine if there are opportunities to leverage campus technology purchases at the system level.

Adopting new technologies - The decision to introduce a new technology to the campus community must take into consideration a wide variety of factors. A solid understanding of the overall technology environment is critical for successful campus-wide adoption of new technology. To ensure timely implementation of new software applications, the ongoing university IT investment assessment effort must include development and maintenance of an up-to-date list of the operating systems on campus computers used for administrative functions. That effort must be done in coordination with the current fixed asset inventory process for IT equipment. The assessment information will be used to determine the impact of the introduction of new software applications and help inform the rollout of the software.

Without the assessment and a plan to accommodate older equipment and operating systems, both distributed and central IT units are often left with the challenge of developing workarounds so older technology can accommodate new software. Maintaining old software on newer equipment and operating systems creates a similar set of challenges and additional workarounds. The workarounds are often difficult to develop and generally require special support services to maintain.

Emerging technologies pose a different set of challenges. Distributed IT units are often in the best position to take risks on the adoption of the latest technologies to meet their unique needs. If the technology is successful it is likely to spread. If the technology does not meet expectations or the company providing it fails, recovery is much quicker than with the enterprise technologies.

Efforts to sustain the IT investment at UNLV in a cost effective matter should account for the need and desire for individual units to pursue new technologies unique to their disciplinary pursuits. When the new technologies adopted in individual units start to cross units, the TRB must review how widespread the adoption might be and determine how those technologies will be supported as they continue to grow.

The IT investment assessment effort needs to encourage innovation and the adoption of new technologies while simultaneously monitoring the IT environment for the unintended consequences (e.g., negative impact on students) or missed opportunities (e.g., possibility for cost savings and provision of support) associated with technologies that migrate across campus units.

3. Developing funding models. As indicated in the introduction to the UNLV IT Master Plan, securing funding is a complex process dependent on a variety of factors (see Appendix D). Consequently, identifying the source of funding needed to sustain UNLV's IT investment is not within the scope of this initiative. However, developing models to help make informed decisions about the effective use of IT funds is an important part of optimizing the current IT environment.

Within the central IT organization only a few sources of ongoing funding are available for hardware and software expansion as services grow or for routine replacement of aging technology. A central fund of \$350,000 is available for annual replacement of computers in academic departments and student fees are available to help support a portion of IT services dedicated to student use.

As with other UNLV units, rising operating costs consume the vast majority of the central IT organization's budget, and the limited remaining funds must be carefully allocated between replacing the most at risk systems and supporting demands for new services. UNLV's central IT organization estimates that 90% of its technology refresh is accomplished with one-time funds. Every effort is made to utilize these one-time funds to meet the university's most pressing needs. However, constraints on the funds and the unpredictability of annual allocations pose challenges for creating a systematic approach to sustaining the IT investment under central IT's stewardship. These same challenges are replicated in distributed IT units across the university. A more predictable and comprehensive approach for utilizing annual funds will help UNLV design and sustain an optimal IT environment.

Addressing central and distributed IT needs - UNLV's highly distributed IT environment poses additional challenges to establishing strategic funding models for sustaining IT investments. For example, each major division on campus is responsible for providing computers for the employees in the unit. While the university provides minimum technical specifications for new computer purchases and selects a small number of approved suppliers, the individual units determine when computers will be replaced.

As computers age, they require additional service, are more prone to security vulnerabilities, and often require special workarounds to connect to new services. Those units without dedicated IT support staff that cannot afford or choose not to replace aging computers pass the rising costs of maintaining those computers on to central IT. Other units opt for shorter refresh cycles and purchase computers with newer operating systems without adequate consideration of older applications still in use on campus, creating challenging IT support issues. To balance the needs of distributed and centralized IT units, the funding model for refreshing computers must account for the full cost to the university including the costs of replacing computers too frequently or not frequently enough.

Similarly, distributed IT units may acquire new technology that accelerates the need for expansion, replacement, or renewal of the university's IT infrastructure. The units may also acquire new services for the constituents in their unit. On occasion, those services expand to serve the broader campus community. The lifecycle costs of sustaining these investments are rarely part of the initial funding.

In the absence of a comprehensive approach for sustaining IT investments, both central and distributed IT units are developing use-based charges as a method to fund existing and new IT services. The proliferation of new rate structures perpetuates the ad hoc nature of IT service provision, excludes some units from receiving much needed services, and can incentivize activity that puts the university at risk (e.g., housing servers under desks rather than in secure data centers).

As UNLV continues its transition to a Top Tier institution, consideration should be given to the development of rates for technology services that can be directly charged to grants. Doing so would reduce the pressure on state-funded budgets to provide those services. UNLV's IT governance structures (i.e., the TAC and the TRB) are responsible for developing the guidelines and approval processes used to determine which components of the IT environment are best delivered on a pay-per-use model.

Optimizing technology refresh programs - While the level of sophistication in hardware, software, and other technology assets may vary depending upon responsibilities, all UNLV employees should have access to basic, reliable, and up-to-date technology to be productive. At a minimum, the technology should have an optimal operating system to run the commonly used campus applications, be secure, and function effectively. Old or out-of-date technologies (e.g., computers running operating systems that are no longer supported by the vendor) threaten the integrity and security of the UNLV IT environment, reduce the usefulness of the technology, and are inefficient in terms of the increased staff support required to maintain functionality.

Replacing UNLV IT assets when they have failed or are no longer supported by the manufacturers requires a significant investment in recurring resources. The UNLV IT funding strategy must include the development of technology refresh cycles that reflect changing needs, evolving standards, and new technologies. The refresh cycles must balance both technical and cost considerations and should not be based solely on the age of the technologies. The refresh cycles will vary greatly across types of technologies (e.g., computers, network equipment, software applications, etc.) but should be developed with the following factors in mind:

- Minimum technology specifications to run commonly used campus applications
- Anticipated changes to campus applications that require up-to-date operating systems, browsers, databases, etc.
- Capacity planning (e.g., impact to network of increased use of video) and utilization targets (e.g., exponential increase in use of the learning management system)
- Consolidation opportunities (e.g., server virtualization, additional hardware standards)
- Upgradeability of existing hardware components (e.g., ability to increase memory capacity to extend useful life)
- Changes in technology (e.g., software-as-a-service, off-site hosting options, ubiquitous wireless, business analytics and reporting)
- Life cycle of technology costs (e.g., increased maintenance costs for aging hardware)
- Reliability metrics (e.g., equipment performance better or worse than expected)
- Information technology security requirements (e.g., implications for the network, servers and databases in light of the need for encrypting data in transit and at rest)

Additional information to consider when developing technology refresh cycles is included in the section

below entitled, “*Key Drivers for Creating Optimal Technology Refresh Cycles.*”

The cost savings associated with the implementation of IT asset refresh cycles are not likely to be realized until the cycles have been funded for some time. Other benefits that could be realized sooner include:

- Reduced number of incidents/outages and their duration
- Reduced IT infrastructure complexity through hardware standardization
- Addition of new capabilities/functionality through the use of new hardware
- Fewer security audit findings through the replacement of unsupported hardware
- Improved visibility into future infrastructure investments

Optimal technology refresh cycles must also take into consideration how the work environment is being impacted by employees who choose to use their personal devices to do their work. These choices will determine which technologies need to be purchased by the university and when those devices will need to be refreshed (see Initiative 11).

Finally, decisions about whether and when to refresh are not always straightforward. Changes in where and when work is done and on what devices impact refresh decisions for individual productivity tools. The complexity and interdependence of enterprise technology environments complicate decisions (i.e., maintain, upgrade, or replace) about any single hardware component within the environment (i.e., virtualized servers, shared storage appliances, network devices). The refresh decisions must be considered at the application level and must include an analysis of application interdependencies, infrastructure interdependencies, and overall system-level architectures. Failure to do so can lead to disruptive and costly outages and customer dissatisfaction.

Sustaining grant-funded acquisitions - A particularly difficult challenge at UNLV is the ability to refresh technology infrastructure acquired through external funding sources (e.g., grants, contracts, gifts) or one-time allocations from centralized end-of-year funds from university sources. While some units are able to build the costs of replacing equipment purchased with one-time funds into unit operating budgets, most have no funding sources to cover the replacement and/or ongoing maintenance costs. The replacement and ongoing costs of maintaining equipment purchased with one-time funds need to be considered when the equipment is initially purchased. New funding models must be developed to ensure the programs that the technologies support do not languish due to aging equipment, no longer supported applications, and/or inadequate connectivity.

A new model for sustaining IT investments starts with making thoughtful initial purchasing decisions based on standards. Periodic and thorough ongoing assessments of these investments will determine when technologies need to be decommissioned, redesigned, consolidated, or replaced with newer technologies. Finally, the model must include funding mechanisms that balance the use of central and distributed IT funds, optimize refresh cycles, support a robust underlying infrastructure, and address replacement costs for equipment purchased with grant funds or acquired through donations. Failure to develop a new model leaves the campus at risk and will impact the ability to meet its Top Tier objectives.

Key Drivers for Creating Optimal Technology Refresh Cycles.

A 2011 article by Shiwanand Pathak, entitled, “Technology Refresh Management,” highlights some of the forces that drive technology refresh. Eight key factors are described.

Aging/obsolete technology - Many organizations have aging technologies and no proactive approach for regular technology assessment. As long as the existing technology is meeting its intended purpose it is

not replaced. Legacy technologies are usually heavily customized to meet user needs. Each change makes it more difficult to migrate to newer technology.

Out-of-support technology - Suppliers upgrade their technology and subsequently stop supporting older versions. The suppliers are motivated to migrate customers to the latest version of their technologies.

Skill set shortage - As technology advances, the focus shifts to the newest breeds of technologies. Over time this causes a shortage in the people who know the legacy technology and acquiring skilled resources becomes an issue.

Compliance - Regulatory compliance is mandatory for all organizations. Organizations must develop procedures to prevent security leaks and ensure controls are in place to meet compliance requirements. As technology components approach obsolescence and vendors stop supporting them, the components become more susceptible to security incidents

Cost reduction - Organizations think technology refresh decisions are high investment items. Technology refresh actually helps reduce operational expenses and enhances organization capability, which in turn helps to lower the overall cost of IT. Over time legacy technology becomes expensive due to the high cost of maintenance.

Standardization - Technology standards are often developed to reduce the diversity of technology components in a complex organization. Technology refresh can be used to help achieve standardization goals.

Innovation - Organizations scan the technology environment constantly for the technological innovations that will provide them competitive advantage. Technology refresh can serve as a strategy to migrate to the newer technologies.

Vendor stability - Organizations prefer to use products from vendors that are stable and have good market standing. If the viability of a vendor changes, technology refresh provides an opportunity to change vendors.

The article also offers some suggestions to avoid the technology obsolescence trap:

- Put IT strategic planning at the heart of the CIO management agenda
- Develop a technology strategy
- Do a health check of the current IT landscape
- Fund a technology refresh program
- Focus on retiring older systems

The full article can be found at: <http://www.sig.org/newsletter.php?id=5913>

Appendix 8A – UNLV Cyber Security Team Membership and Charges

Cyber Security Team

Purpose

The Cyber Security Team is comprised of information and technology specialists from across the campus. The primary responsibilities of the group are to:

- Create and foster a campus-wide approach to information technology security
- Recommend to the Technology Review Board policies, procedures, and technical measures to support the development and maintenance of a secure information technology environment
- Promote awareness on IT security issues, compliance changes, threat mitigation, and individual responsibility for helping ensure a safe campus IT environment

Chair

Chief Information Security Officer or designee

Membership

Members	Appointed By
Chief Information Office (1) <ul style="list-style-type: none"> • Chief Information Security Officer or designee 	Chief Information Officer
Central IT (3) <ul style="list-style-type: none"> • Desktops • Network • Systems 	Chief Information Officer
IT Representatives from Campus Units (9)* <ul style="list-style-type: none"> • Institutional Analysis & Decision Support • Engineering • Finance & Business • UNLV Libraries • School of Dental Medicine • School of Medicine • Student Affairs • Supercomputing Center/Research • Thomas & Mack 	Appropriate Unit Representative
IT Forum Representative (1)	IT Forum through election
Faculty (1)	Faculty Senate

* Campus units on the list have unique IT security requirements.

Charges

- Adopt an industry standard security framework to guide security initiatives on campus (e.g., SANS Top 20, ISO270001, NIST 800-53)
 - Select the framework

- Map current campus security measures to the framework
 - Recommend actions (e.g., policies, projects, services) to fill gaps in the framework
- Recommend changes to the framework, policies, and procedures to maximize the university's ability to meet compliance requirements (e.g., FERPA, HIPAA, PCI) and changing security risks
- Develop and maintain a list of security initiative priorities to be reviewed periodically (at least semi-annually) and submitted as part of the strategic technology planning processes
- Develop an annual risk assessment and mitigation report for review by the Technology Review Board
- Develop and maintain a Security Liaison program
 - Promote awareness of security issues that could impact the campus
 - Engage the liaisons in the development and implementation of campus security initiatives
- Develop position-specific security responsibilities and provide awareness and training programs to ensure employees and students can meet those responsibilities
- Develop and maintain collaborative communication mechanisms for security awareness, information dissemination, and campus input regarding security matters
- Recommend security measures for emerging technologies as they become widely used on campus (e.g., mobile devices, cloud services)

Security Liaisons

The work of the Cyber Security Team is dependent on assistance from every major unit on campus. Individuals knowledgeable about the security needs of their units, who are willing to assist with creating a more secure information technology environment at UNLV, will be recruited to serve as Security Liaisons.

Security Liaisons will be expected to:

- Maintain a high-level awareness of current security issues that could impact their unit and/or the campus
- Assist in the implementation of security initiatives in their units and across campus
- Bring unit-specific security matters to the attention of the Cyber Security Team
- Ensure that newly proposed security measures take into consideration the unique data and research needs of the units they represent

Appendix 10A – Challenges Resolved with Effective Identity Management

- 1. Multiple systems independently manage identities** - The university has multiple systems that manage identity. Microsoft Active Directory provides access to resources on the network. Another system provides access to the wireless network, while yet other applications (e.g., MyUNLV) manage identities within the individual application.
- 2. Identity information is stored in multiple places** - Storing identity information in multiple places means that each time the university buys or builds a new information technology system, technologists must spend considerable time determining how identities for that system will be handled. When an application is built it must include a way to control access to data. When an application is purchased an internal store must be populated either manually or by drawing data from an authoritative source (e.g., the student information system - MyUNLV, the human resources management system - HRMS). The internal store must also be maintained as people enter and leave the system.
- 3. Management of multiple identities** - Individuals at UNLV have multiple identities, sometimes even within the same system. Multiple identities create several challenges. For example, if a student needs to reach the instructor of a class, knowing the instructor's phone number and email address would be convenient. If the instructor's identity in MyUNLV is not tied to a record in HRMS, the contact information must be entered and maintained in both systems, creating additional work and the possibility for inconsistencies between the systems. This situation is even more complicated when building an application like a Web portal that gives people access to multiple systems (e.g., MyUNLV, HRMS, WebCampus, e-mail). The lack of a common unique identifier in MyUNLV and HRMS makes it difficult to match a faculty member in HRMS to an instructor in MyUNLV. Consequently, it is very difficult to give faculty access to information that is restricted to the instructor of a particular course. Furthermore, when individuals leave the university, access to multiple systems is revoked one system at a time. An identity management system would ensure that the individuals are removed from all systems simultaneously.
- 4. Separate identities create a variety of security risks** - Separate identities can also create the opportunity for harm. Creating a single identity makes it easier to audit and prevent inappropriate actions. For example, an identity management system would set up a single identity that included information about the multiple roles for a UNLV employee enrolled in a class (i.e., employee and student). The employee, call her "Jen Doe," requires access to data in the student information system to do her work. Jen would be able to edit information in accordance with her job responsibilities but be prevented from making changes in the course for which she is enrolled. In the absence of a single identity, implementing safeguards against unauthorized activity relies on people who know that the "Jen Doe" taking the class is the same as the "Jennifer Doe" who edits information in MyUNLV.
- 5. Systems lack the automation to keep data updated and consistent across systems** - It should be possible to enter data only once. When someone joins the faculty or is admitted as a student, an authoritative record should be created in MyUNLV or HRMS. The information from one of these systems should populate other systems automatically. The other systems should regard MyUNLV and HRMS as "sources of truth" and not alter the information. Any changes should be made only once in the authoritative system and propagated to other systems as needed.

Appendix 10B - Identity Management Implementation Three-Year Action Plan

Phase 1: Complete the Initial Implementation

1. *Install and configure UNLV's Identity Management, Access Management, and Federated Identity Management suite.*

The new software suite will be populated with core data about every UNLV employee and student. Each individual will have an ID and password. Together the core data, ID, and password form the basic foundation for the identity management system. The first set of core data will contain limited information and attributes about the individuals. The core data will be expanded over time.

2. *Populate the system with the minimum attributes needed to establish a basic Federated Identity required to participate in the InCommon Federation.*

The InCommon Federation is the U.S. education and research identity federation, providing a common framework for trusted shared management of access to online resources (more information available at: <https://incommon.org>).

InCommon grants several layers of trust based on the security and robustness of the home institution's identity management systems. In July 2015 UNLV completed the most basic connection to support sharing/borrowing of library research materials through the HathiTrust (more information available at: <https://www.hathitrust.org>).

3. *Establish synched single ID (i.e., login) and password for multiple campus systems.*

Users will have a single login and password for the following systems: Blackboard Learn, email, Google Apps, iLeave, desktop login, and Virtual Private Network (VPN) services. When a user changes his or her password it will be changed in all of the systems with no further action needed.

Phase 2: Provide Access to Multiple Campus Applications

1. *Add Secure Wireless to the group of applications that use the identity management system for authentication and expand wireless access to InCommon members (i.e., eduroam)*
2. *Ensure authentication (i.e., logins and passwords) for new enterprise applications and/or cloud services are compatible with the campus identity management system.*

As new applications are considered for campus adoption, access and authentication requirements will need to be reviewed. Whenever possible, campus standards for access and authentication will be used and the identity management system will be the source for the required data. Exceptions will be granted as needed and non-standard authorization solutions will be integrated with the campus identity management system through purchased products or in-house integration development.

When necessary, new groups will be added to the identity management system to accommodate the access and authorization requirements for new applications.

3. *Add additional core data to the identity management system to allow more fine-grained access to campus systems.*

Bringing more data from the student information system into the identity management system will make it possible to increase the number of groups in the system based on attributes such as academic department or students in a particular course. The new attributes can then be used to allow

group access to restricted resources (e.g., an academic department website used only by members of that department, course materials stored in a file management system for use by the members of a particular course).

4. *Implement account deprovisioning functionality within the identity management suite.*

To help ensure the security of institutional data, it is imperative that access to university accounts be deactivated or deleted when a member of the campus community leaves. The identity management suite provides functionality that will assist with the deprovisioning of all accounts that are connected to the suite. As development of the application continues, it will also be possible to fine-tune the deprovisioning processes to accommodate changes in access when employees transfer positions (e.g., staff member moves from the Registrar's Office to the Cashier's Office) or take on new responsibilities (e.g., a faculty member is elected chair of an academic department for a three-year term).

Phase 3: Extend the Functionality

1. *Make available role-based authorization to support collaboration, application, and data access based on role/group identities for employees using data from iNtegrate 2 (See Initiative 9).*
2. *Expand the basic information needed for InCommon to include full eduPerson classification to support easier access to research, grants, and collaboration requiring higher levels of security.*

The eduPerson classification schema includes widely used information about individuals in higher education environments to provide a common list of attributes and definitions to make secure access to systems across institutions easier. More information about the full eduPerson classification attributes can be found at: <https://www.internet2.edu/products-services/trust-identity-middleware/eduperson-eduorg>

3. *Develop strong links between data governance and identity management.*

The identity management system is dependent on a strong data governance structure. Only after the access and role decisions are made can the identity management system be used to provide appropriate authorization and differentiated access. The determination of who should have access to what data and what type of access they should have (e.g., read only, create, edit, and delete) is the responsibility of the campus Data Stewards. Procedures for determining what access is appropriate for a particular type of data or for a particular role on campus (e.g., faculty member, department chair, student) need to be developed as part of data management and reporting efforts (see Initiative 13).

Appendix 11A – Current UNLV Mobile Applications

UNLV Mobile Applications Last Updated December 2015

Mobile Applications Currently in Use at UNLV

Name	Brief Description	Type	Unit(s) Responsible
UNLV Mobile	Provides access to MyUNLV, maps, videos, news, fight song	Built in-house	Enrollment Student Services Office of Information Technology University Communications
UNLV Digital Collections	Provides access to a growing number of digital collections maintained by UNLV Libraries	Built in-house	UNLV Libraries
Blackboard Learn	Provides access to WebCampus, UNLV's learning management system	Purchased from Blackboard	Office of Information Technology
UNLV Alumni	Provides access to alumni benefits, membership information, events, directory, class notes	Built and maintained through contracted services	UNLV Alumni Association Office
UNLV Rebels Gameday	Provides access to live gameday audio, social media streams, fan guides, stadium maps, scores and statistics, and alerts	Built and maintained through contracted services	UNLV Athletics

Mobile Applications Coming Soon or Under Development

Name & Expected Arrival Date	Brief Description	Type	Unit(s) Responsible
OOHLALA Spring 2016	Enables student organizations to provide students access to information, activities, communities, games and/or other products and services via a mobile application	Purchased from OOHLALA	Consolidated Students of the University of Nevada, Las Vegas (CSUN)

Appendix 11B – Map of Current UNLV Wireless Coverage on March 1, 2016



-  **Full Coverage**
-  **Partial Coverage**
-  **No Coverage**

Appendix 12A – Academic Program Needs for Document Management

Examples of Document Management Needs to Support Academic Programs

Below find examples of academic business processes pertinent to the Top Tier initiative in academic programs, faculty affairs, and academic resource planning that would be more effectively managed through inclusion in the document management solution adopted by the campus.

Annual Self-Reporting, Annual Evaluation, Merit Ranking for Faculty, Promotion and Tenure

Processes for annual self reports, annual evaluation, merit ranking for faculty as well as promotion and tenure have been successfully transferred from a paper-based system to an all-electronic system through the use of interactive forms and centralized file sharing. The processes could become even more efficient through the functionality contained in a comprehensive document management/workflow solution (e.g., preprogrammed workflow, automated records retention, role-based automated authorization).

Sabbatical and Faculty Development Leave Applications

Processes for the submission and approval of sabbatical and faculty development leave applications remain entirely paper-based. Using the functionality contained in a comprehensive document management/workflow solution would reduce the administrative burden for faculty applying for the two programs, those who must review and approve the applications, and the administrators who track the processes.

Personnel Management

Incorporating personnel management functions into a document management system with programmed workflow and automated tracking would help eliminate bottlenecks in all aspects of academic personnel management - hiring, onboarding, retaining, evaluating, promoting, and separating from the university. The continued reliance on paper-based and wet-signature-based information management for all these areas greatly limits the ability of the Executive Vice President and Provost to effectively steward academic resources, including faculty lines and support for release time and research needs.

Faculty Workload Analysis in Relation to Research Assignments

The adoption of a comprehensive document management system would help the university address a variety of needs directly relevant to establishing an administrative culture ("soft infrastructure") essential for achieving Top Tier status. These include policies and procedures to better manage workload, course reassignment, course buy-out, and extra-contractual compensation. Without an enterprise document management and workflow system the university is unable to efficiently track, analyze, and report on faculty workload in relation to research assignments at the unit, college, or university level.

Appendix 13A - UNLV Data Governance & Business Intelligence Background

UNLV's current Data Governance Policy approved in July 2010 states that:

University data are institutional assets maintained to support UNLV's central missions of teaching, research, and service. "University data" refers to collections of data elements relevant to the operations, planning, or management of any unit at UNLV, or data that are reported or used in official administrative University reports.

The full policy available online at: [http://ir.unlv.edu/IAP/Files/UNLV Data Governance Policy July 2010.aspx](http://ir.unlv.edu/IAP/Files/UNLV%20Data%20Governance%20Policy%20July%202010.aspx) provides a clear structure for governing data as an institutional asset central to the support of university strategy. The policy was informed by consulting the following policies developed to oversee data governance at Tier One institutions:

- Arizona State University (<https://uto.asu.edu/policy/data-handling-standard>)
- University of Virginia (<http://www.virginia.edu/informationpolicy/admindataaccess.html>)
- University of Pennsylvania (<http://www.upenn.edu/computing/da/charter.html>)
- University of Michigan (<http://spg.umich.edu/policy/601.12>)
- University of Minnesota (<http://www.policy.umn.edu/Policies/it/Use/DATACLASSIFICATION.html>)
- Indiana University System (<http://datamgmt.iu.edu/policies.shtml>)

As the university solidifies its Top Tier strategic plans, the Associate Vice Provost for Institutional Analysis and Decision Support will need to ensure that the university's data governance policy maintains alignment with university strategic directions.

In addition to UNLV's data governance policy, the university has a set of six Fundamental Principles for Data Warehousing adopted in 2009. They are:

1. Data Integrity
2. Operational Effectiveness
3. Access
4. User Friendliness
5. Implementation and Operational Efficiency
6. Institutional Consensus

More information about these Fundamental Principles for Data Warehousing is available at: http://ir.unlv.edu/IAP/decisionsupport/Content/myUNLVAnalytics_DW_Principles.aspx

Appendix F: Glossary of Terms and Acronyms

The following glossary provides brief definitions of acronyms, key terms and concepts that are relevant to this Plan. Most definitions were provided by *Computer Desktop Encyclopedia*, Version 26.3, The Computer Language Company Inc., Point Pleasant, Pennsylvania, 2013.

Term/Concept	Definition
Active Directory	Microsoft's Active Directory is part of the Windows network architecture and is used for managing permissions and user access to network resources. At UNLV the ACE account is the Active Directory account. The ACE account is used to access workstations, computer labs, web-based applications, and shared network resources.
Bandwidth	Bandwidth is the amount of data that can be transferred over a network in a specified amount of time. Limited bandwidth may disrupt the smooth transmission of data, causing files to transfer more slowly and potentially disrupting the smooth playing of videos or the loading of web pages.
BYOD	Bring-Your-Own-Device: Refers to employees bringing personal devices to work (e.g., laptop, smartphone or tablet) in order to interface to the organizational network.
CBC	Carol C. Harter Classroom Building Complex
CHECS	Center for Higher Education CIO Studies
CIO	Chief Information Officer: The executive in charge of information processing in an organization.
CISO	Chief Information Security Officer: The person in charge of all staff members who are responsible for promulgating, enforcing, and administering information security policies for all systems within an enterprise or division.
Cloud	Computer services hosted remotely on the Internet rather than a local server or a personal computer.
Content Management	Content Management is the ability to manage unstructured information in an organization, wherever that information is found. CM technologies are applied to traditional content, such as office documents and printed graphics, as well as web pages, email, and rich media.
CRM	Customer Relationship Management: An integrated information system that is used to plan, schedule, and control communication to targeted audiences.
Cross-training	Training someone in another activity that is related to their current work in an effort to enhance efficiency.
CTO	Chief Technology Officer: The executive responsible for the technical direction of an organization.
Data Governance	Data governance is an umbrella term for a formal and systematic approach to maintaining high quality data within an organization. It includes data validation and cleansing as well as authorization, privacy, and security issues.
Data Mining	Exploring and analyzing detailed business transactions; uncovering patterns and relationships contained within the business activity and history.

Term/Concept	Definition
Data Standards	Standards that provide consistent meaning to data shared among different information systems, programs, and agencies throughout the data's life cycle
DBA	Database Administrator: A person responsible for the physical design and management of the database and for the evaluation, selection, and implementation of the database management system.
DFS	Desktop and Field Services
Digital Signage	Digital signage is using electronic signs to advertise products or information. Digital signage includes various types of flat-panel display technologies to target audiences in different areas across the campus, such as the Student Union and the Library.
Disaster Recovery	A plan for duplicating computer operations after a catastrophe occurs, such as a fire or earthquake. It includes routine off-site backup as well as a procedure for activating vital information systems in a new location.
Document Management	Document management involves the capture (imaging) and management of documents within an organization. The term originally implied only the management of documents after they were scanned into the computer. Subsequently, it became an umbrella term that embraces document imaging, workflow, text retrieval, and access to multimedia artifacts.
Document Management System	Document Management System software manages documents for electronic publishing. It generally supports a large variety of document formats and provides extensive access control and searching capabilities across local and wide-area networks. A document management system may support multiple versions of a document and may be able to combine text fragments written by different authors. It often includes a workflow component that routes documents to the appropriate individuals.
DR	Disaster Recovery: A plan for duplicating computer operations after a catastrophe occurs, such as a fire or earthquake.
EDUCAUSE	A nonprofit association whose mission is to advance higher education through the use of information technology.
E-learning	Electronic-Learning: An umbrella term for providing computer instruction (courseware) online over the public Internet, private distance learning networks, or in-house via an intranet.
Electronic Workflow	Electronic workflow is the automatic routing of documents to the individuals responsible for working on them. Workflow systems provide the information required to support each step of a business cycle. The documents may be physically moved over the network or maintained in a single database with the appropriate individuals given access to the data at the required times. Triggers can be implemented in the system to alert managers when operations are overdue.
Enterprise	The term enterprise is used when referring to the entirety of the university organization.
Enterprise Software	Software used in an organization as opposed to software used by individuals.
E-portfolio	Electronic Portfolio: A collection of electronic artifacts such as presentations, reports, and accomplishments that reflect the efforts of an individual, group, or institution.

Term/Concept	Definition
ERP	Enterprise Resource Planning: An integrated information system that serves all departments within an enterprise. ERP generally refers to the use of packaged software rather than proprietary software written by or for one customer.
ESS	Enrollment and Student Services
EVP&P	Executive Vice President and Provost: Serves as the chief academic and budget officer for UNLV, and acts as the chief executive officer in the absence of the president.
FDH	Flora Dungan Humanities Building
Fiber Optic Network	A method of transmitting information from one place to another by sending pulses of light through a series of optical fiber cables.
FTAB	Faculty Technology Advisory Board
FTE	Full Time Equivalent: Number of working hours that represents one full-time employee during a fixed period of time.
Help Desk	A source of technical support for hardware or software. Help desks are staffed by people who can either solve the problem directly or forward the problem to someone else. Help desk software provides the means to log in problems and track them until solved.
Homegrown	Software developed by the institution to meet specific needs usually because no suitable commercial package is available.
HR	Human Resources: The human resources department within an organization manages the administrative aspects of the employees.
HRMS	Human Resources Management System
HWB	Herman Westfall Building
IADS	Institutional Analysis and Decision Support
IAP	Institutional Analysis and Planning
Identity Management	Identity management is management of an individual's identity. Within the enterprise, an identity management system is made up of a system of directories and access control based on established policies. It includes the maintenance of the system (i.e., adds, changes, deletes) and generally offers single sign-on so that an individual only has to log in once to gain access to multiple resources.
In-house	Solutions developed by the organization in which they are used.
IT	Information Technology: Processing information by computer, which encompasses "information management" and "computer science"
ITCC	Information Technology Coordination Committee
ITIL	Information Technology Infrastructure Library
IT Service Catalog	A list of IT services that an organization provides its employees or customers.
LAN	Local Area Network: A communications network that is typically confined to a building or premises.

Term/Concept	Definition
LMS	Learning Management System: An information system that administers instructor-led and e-learning courses and keeps track of student progress.
LMSCC	Learning Management System Coordinating Committee
Lotus Notes	Lotus Notes is messaging and collaboration software from IBM that provides email, document sharing, workflow, group discussions, calendaring and scheduling. It also accepts plug-ins for other functions. Lotus Notes was the official email and calendaring software provided to UNLV faculty and staff until October 2014.
MB	Megabyte: Approximately one million bytes (1,048,576 bytes)
Mb	Megabit: 131,072 bytes
mbps	Megabits per Second: One million bits per second. Mbps is a measurement of peripheral data transfer or network transmission speed.
Mobile Application	A software application that runs in a smartphone, tablet, or other portable device.
MOU	Memorandums of Understanding
NDE	Network Development and Engineering
Network Connectivity	The measurement of a physical and logical connection of a computer network or an individual device to a network, measured in megabits per second (mbps).
Network Core	The central part of a network that provides various services to customers who are connected to that network.
NSCEE	National Supercomputing Center for Energy and Efficiency
NSHE	Nevada System of Higher Education
NWCCU	Northwest Commission on Colleges and Universities
OIT	Office of Information Technology
PAR	Paradise Campus Building
PBX	Private Branch Exchange: An in-house telephone switching system that interconnects telephone extensions to each other as well as to the outside telephone network (PSTN). A PBX enables a single-line telephone set to gain access to one of a group of pooled (shared) trunks by dialing an 8 or 9 prefix.
Portal	A software tool available through a secured website which has the ability for the service provider to track users' web activity once they log onto the portal.
Project Portfolio Management (PPM)	A discipline that seeks to better manage resources and project work, and to improve collaboration on like projects using specialized software.
Refresh	Upgrading and replacing of computer systems, peripherals, and other technologies to ensure the access to the most basic services and efficiency of existing resources.
SaaS	Software-as-a-Service: Software is licensed on a subscription basis and is vendor hosted.
SAN	Storage Area Network

Term/Concept	Definition
SCS	System Computing Services: Computer division of the Nevada System of Higher Education.
SEA	Systems Engineering and Administration
Self-Service Application	A software application that allows a user to obtain information or complete a business transaction on a computer that has traditionally required the help of a human representative.
Self-Service Functionality	Self-service functionality is the ability for an individual to obtain information or complete a business transaction that has traditionally required the help of a representative over the phone or in person.
Server	A server is a computer system in a network that is shared by multiple users. Servers are primarily accessed over the network.
Service Level Agreement (SLA)	<p>A service-level agreement is a contract between a service provider and an individual needing that service. The agreement specifies the level of service expected during its term. SLAs are used by vendors and customers as well as internally by information technology units and the individuals and units who use their services. The agreements can specify bandwidth availability, response times for routine and ad hoc queries, response time for problem resolution (e.g., network down, machine failure, etc.) as well as expectations of the technical staff.</p> <p>SLAs can be very general or extremely detailed, including the steps taken in the event of a failure. For example, if the problem persists after 30 minutes, a supervisor is notified; after one hour, the account representative is contacted, etc.</p>
SES	Software Engineering Services
Shared Administrative Service	An initiative that focuses on helping departments control costs and improve service delivery by improving administrative processes and procedures
SIS	Student Information Systems
STAB	Student Technology Advisory Board
Stakeholder	Any individual who may be affected by a business decision. The term may refer to anyone who has some interest in a service.
System of Record	A data management term for an information storage system that is the authoritative data source for a given data element or piece of information.
Systems Analyst	A person responsible for the development of an information system. Systems analysts design and modify systems by turning user requirements into a set of functional specifications.
TBD	To Be Determined
TLC	Teaching and Learning Center
terabyte	Approximately one trillion bytes (1,099,511,627,776 bytes)
Third-party	Typically a company that provides an auxiliary product not supplied by the primary manufacturer to the end user

Term/Concept	Definition
Ticketing System	Also known as an issue tracking system, these computer software packages are usually used at an IT help desk to manage and maintain lists of issues.
UNLV	University of Nevada, Las Vegas
VoIP	Voiceover Internet Protocol: A digital telephone service that uses the network for call transport. VoIP calls can also originate and terminate from regular telephones.