

Prince Mohammad Bin Fahd University

INFORMATION TECHNOLOGY STRATEGY

PREFACE

The Information Technology Strategy volume describes the role Information Technology plays in supporting much of what University does with information automation and knowledge transfer. It acts as an operational manual that guides the PMU executive leadership, IT Professionals and faculty members as they integrate the use of information technology throughout all functional areas of the PMU. In the 21st century, smart technology becomes a fundamental instrument for education, businesses and individuals worldwide to enhance IT services for student's performance and productivity. PMU believes that using smart technology can improve data management, support availability of Internet mobility, stimulate creativity and innovation, encourage factor of globalization phenomena, enhance students' and employees' satisfaction via communication, collaboration, cooperation and connection. Furthermore, using smart technology can reduce utility cost.

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INFORMATION TECHNOLOGY STRATEGY

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INFORMATION TECHNOLOGY STRATEGY

I. INTRODUCTION

The *Information Technology strategic* comprehensive plan is designed to enable PMU to continue in the creative use, application, and provisioning of IT in support of PMU's Strategic Plan. The purpose of this plan to ensure that PMU will be in a position to leverage technology to achieve the instructional and business objectives as it moves forward in meeting challenges over next few years.

Information Technology Services (ITS) staff, have already started pursuing key areas of recommendation and action items to advance and enhance IT infrastructure and services. "The most effective way to ensure that we can address IT at PMU is to have a well-structured, broadly-based, and detailed strategy for use. And just as important as having this "blueprint" for IT advancement, is realizing that the advancement of IT goals in support of the University Strategic Plan – *Creative minds, Transform the world* – is the responsibility of everyone in the PMU Community. Hence, the best means for such a strategic plan to be successful is for it to flow from the needs of the community served by information technology,". Critical to the PMU's success in effectively utilizing IT is to adopt a view that it is a fundamental asset of the institution. Imperative to this is the concept of IT Abundance – where information technology is current, advanced, readily available, and adopted to facilitate and support PMU's students, faculty, and staff within their respective assignments, disciplines, and tasks. The value in an environment featuring IT Abundance is that it redefines what it is possible to do in teaching and learning, research and innovation, and in the efficient and effective operation of our University.

This document, *Information Technology Strategy*, establishes the information technology basis for all design activities for the PMU. These specifications may then be used to transform the concepts contained in the strategy document into an achievable infrastructure that is a key defining characteristic of the university.

The organizing principles of this report are to establish:

- Vision – the characteristics by which the PMU will be known.
- Mission – the core competencies that the PMU seeks to achieve.
- Goals – the specific categories of competencies for which the PMU will strive.
- Strategies – methods of establishing the IT basis for future PMU activities.

* Here, and throughout the remainder of this document, "distance learning" is defined as Web-enhanced course content rather than full courses delivered via distance learning technologies, although full courses may be supported in the future.

II. INFORMATION TECHNOLOGY AT PRINCE MOHAMMAD BIN FAHD UNIVERSITY

A. VISION

Prince Mohammad Bin Fahd University will be renowned for the pervasive, ubiquitous use of state-of-the-art information technologies that enable the PMU's learning-centered environment.

The PMU will be synonymous with and identified as the leading IT-based institution in the international region.

This vision is supported by underlying values and principles:

- Information technology serves the mission of the university.
- To the extent possible, IT will preserve Saudi values.
- IT will serve to help protect intellectual property.
- IT will be convenient, high-quality, and user-friendly.
- IT will not consume an inappropriate portion of the PMU's budget.

The ultimate goal of this technology vision is to make it possible for the PMU to create a learning-centered environment. The infusion of technology into the university environment will enable students to obtain the information they need, when and where they need it, so they can effectively pursue their goals of academic excellence and professional competencies.

Though central to distinguishing the university from other institutions in the Kingdom, technology at the PMU will never be an end unto itself. Technology will be a tool that assists students in building their professional competencies, abilities in critical thinking, skills in problem solving, and dedication to leadership and teamwork.

B. MISSION

In order to achieve its vision of a technology-enabled, learning-centered environment, the PMU will develop a set of core technology competencies and areas of expertise:

- Infuse information and educational technologies into all curricula and learning programs.
- Ensure that the university administration will utilize an integrated management information system.
- Incorporate IT into the facility design.
- Focus IT services on employing contemporary technologies that keep up with the world's changing technology environment.

Using technology, the PMU will be able to tailor instruction and focus the development of competencies to each student's needs and abilities. It will be able to provide skills and knowledge that foster independent learning during the university years and build an ethic of learning that continues throughout the lives of PMU graduates. Technology will enable faculty to enhance their own abilities, create richer learning experiences by bringing more resources into the classroom, and give students a more interactive learning experience. It will help instruct students in personal skills and capabilities as well as academic content. Finally, technology will assist the university in creating an assessment process that not only measures what students already have achieved, but helps direct them to the capabilities they need to develop in the future.

C. GOALS

The PMU will direct its efforts toward a number of targeted goals, each of which will bring the university closer to achieving its mission and realizing its vision.

- Respect and advance Saudi cultural values in a changing learning environment.
- Provide students with the superior technology infrastructure that will equip them with the technology skills to function in the current and emerging working environments.
- Provide faculty with the superior technology infrastructure that enables them to excel in the delivery of effective instruction.
- Provide administrators with a cost effective, flexible, reliable, and secure IT environment that meets the business needs of the university.
- Provide technology tools to facilitate effective student support services.
- Provide an IT governance structure that includes university faculty, students, and staff as well as industry in a collaborative environment.

Regardless of whether they are directed toward administrators, faculty, students, or the university community as a whole, each of these goals contains elements that will assist students in developing characteristic PMU competencies.

The university's technology-infused environment will naturally develop information literacy and familiarity with technology itself. It also will help students achieve skills in critical thinking and reasoning, a global awareness, and abilities in teamwork and leadership. These competencies are "whole person" skills that will make it possible for the individual student and the university to make valuable contributions to the business community and life in the Kingdom.

D. STRATEGIES

Specific strategies will address real-life issues with concrete solutions. For each of its broad IT goals, the university will define and accomplish a number of these strategies.

GOAL 1: Respect and advance Saudi cultural values in a changing learning environment.

Core values of the Saudi culture, built around Islamic traditions and beliefs, will be respected in the design of the information technology infrastructure of the PMU. Separation of the genders in the physical teaching environment as well as, when possible, in the virtual environment, will be preserved. Guidance from the PMU founders and Saudi advisors will be sought as the infrastructure is designed.

1. **Gender separation – *Utilize information technology to support gender separation.***
Videoconferencing will serve several purposes at the PMU, both in distance education and on-campus, where it can be employed to deliver instruction from one classroom to the next. With videoconference facilities available in many classrooms, a male instructor in a classroom with males can teach females in another classroom at the same time. In such an arrangement, the females will not be visible to the males, but the females will be able to see the male instructor. IT security components and measures also will be developed and utilized to ensure gender separation when students, faculty, and staff are using the PMU's services and assets.
2. **Islamic and local cultural values – *Support bilingual language needs as appropriate.***
Although the language of instruction at the PMU will be English, there will still be a need for Arabic instruction in religious studies and Arabic language classes. Additionally, many students, faculty, and staff will use Arabic in situations such as e-mailing colleagues. It is also likely that Arabic will be necessary for communications with some students' parents. Therefore, the IT infrastructure will be designed with the flexibility to support both languages.
3. **Islamic and local cultural values – *Support content filtering consistent with Islamic and local values.***
Firewalls, content filtering systems, e-mail scanning systems, and related methods will be employed to protect the PMU network from retrieval of Internet and inappropriate content via PMU machines that is offensive or against Islamic and local values, where possible.

GOAL 2: Provide students with a superior technology infrastructure that will equip them with the technology skills to function in current and emerging work environments.

The core IT infrastructure will be designed in a fashion that allows the technology to support a learning-centered environment. The following strategies focus on the requirements of the infrastructure, including the hardware and software that will be supported, and the services that will be made available.

4. Infrastructure – *Provide ubiquitous wired and wireless access to information, communications, and services.*

Students will have access to network resources and services irrespective of the student's physical location on campus. Some applications, such as desktop videoconferencing and other bandwidth-intensive applications, will require wired access. Common areas and classrooms can typically be supported by wireless access.

5. Infrastructure – *Provide a flexible multi-service and very high speed network infrastructure.*

In order that the university can adapt to emerging technologies, provide new IT based services, and protect its financial investment, the design of the network and its specifications will allow for high throughput and the support of multiple services such as voice, video, data, security, and content streaming.

6. Infrastructure – *Provide network connectivity to student dormitories.*

Students who will reside on university property will have the benefit of full-time access from dormitory rooms to the university's IT environment and the Internet.

7. Hardware – *Equip each student with a portable computing device, enabling access to instruction, services, and support.*

The PMU will be a "laptop campus," where students will be required to have a laptop computer (either purchased directly by the students or provided by rental or in some other manner by the university or a vendor). The use of laptops will allow students to access the university's ubiquitous infrastructure from classrooms and commons areas. The use of laptops will also enable the PMU to extend the instructional environment to students' homes. Requirements for standardization, including identified vendor and baseline specifications, will be established for the cost-effective support of laptops.

8. Hardware – *Support common access labs for curriculum-specific requirements, because certain applications are best run from dedicated machines.*

The campus will support specialized hardware for some discipline-specific applications. Common computer access facilities (typically called computer labs) will be built and stocked with high-end desktop computers. These computers will be required for applications that may support multi-media, computer aided-design, and collaborative virtual environments. Attention will be given to processor speeds and adequate RAM as well as other hardware requirements to support the efficient deployment of applications.

9. Hardware – *Provide network services that enable file and print sharing.*

Centralized hardware resources such as printers and file servers will be provided to support the use of laptop computers. These networked resources will also support standardized software deployment, file sharing and storage, and communication.

10. Software – *Provide current releases of industry standard office productivity and security software, and provide timely updates.*

Students will have access to widely adopted productivity tools. A campus-wide licensing agreement for the Microsoft Office Suite, the WordPerfect Office Suite, or similar tools will allow standardization of software packages and release levels. It also will prepare students to use the common software found in the professional world. Distribution of the software via CDs or installed via the core network are viable options.

11. Software – *Facilitate access to discipline-specific software where appropriate.*

Specialized software that supports unique programmatic competencies and course curricula will be made available for student use. These applications can be provided on fully licensed computers in a lab setting, or via special licensing arrangements for the student's laptops.

12. Software – *Provide a course management system (CMS) for the delivery and/or support of all courses.*

The campus will support an enterprise-level courseware management system that is tied to the student information system. This system will create a "course instance" for all courses taught throughout the campus, so that electronic access to campus-based as well as distance learning course resources will be available any time and at any location. The management system will provide access to static resources such as course syllabi and assigned readings, as well as interactive resources such as software simulations. Interactive communications tools such as e-mail, discussion forums, real-time conferencing, and document sharing also will be made available.

13. Software – *Provide a Web-based environment that enables authorization and authentication services and that provides access to student services, the library, and the CMS.*

A Web-based interface will be created that will provide a gateway for students to access various campus services online. This type of access is made available through Web services that allow for the integration of different applications and provide for secure data exchange between systems. A centralized directory service can facilitate single sign-on capabilities, allowing the university to personalize and customize services and resources for each student. Such directory services are one of the key underpinnings that will enable the technology vision of the PMU. All “middleware” will adhere to standards that allow data exchange among systems. In selecting vendors for the PMU infrastructure, consideration will be given to companies that provide Web-ready front-ends for their products.

14. Support – *Facilitate access to hardware repair and maintenance services.*

Requiring students to have a laptop computer will require a system for repair and/or replacement of those machines. Standardization requirements, including identified vendor and baseline specifications, will be established for the cost-effective support of the laptop by laptop vendors. Any such support system should provide same-day, on-site repair guarantees for critical parts and next-day shipment guarantees for non-critical system components. The development of a centralized support organization that supports faculty and staff hardware will further enhance the services that the university provides.

15. Support – *Provide frequent training and user-friendly software distribution services.*

The university’s centralized support organization will conduct training courses for students on the use of standard software packages, either face-to-face or via computer-based training. The organization also will provide distribution of standardized software and provide maintenance for student laptops. The distribution and configuration of software will enhance student access to network and communication services.

16. Support – *Provide helpdesk services that allow efficient self-help as well as access to live assistance.*

The centralized support organization will provide access to helpdesk services and a mechanism for tracking the services it provides. Users should be able to self-diagnose common issues through the use of an online knowledge-base and a “frequently asked questions” area. Other assistance will be provided through e-mail and messaging services. Intervention activities such as virus alerts and software updates also will be provided.

17. Security – *Provide the necessary security controls and systems to ensure as much as possible a safe network and computer environment.*

The necessary security components will be employed to ensure as much as possible that students, staff, and faculty all enjoy the most up-to-date security protection via centralized updates for anti-virus protection, O/S patches, firewalls, content control systems and other security methods.

18. Security – *Provide the necessary secure facilities to access PMU IT resources remotely.*

The university will facilitate remote access for students, staff, and faculty to its IT resources via the Internet, direct dial-in, or other necessary means, so that persons may work off-campus if they desire.

GOAL 3: Provide faculty with the superior technology infrastructure that enables them to excel in the delivery of effective instruction.

The core infrastructure of the PMU will be designed in a fashion that allows the technology to support the instructional applications and information resources required by faculty. The following strategies focus on the requirements of the infrastructure, including the hardware and software that it will support, and the services that will be made available.

19. Infrastructure – *Provide wired and wireless access to information, communications and services.*

Faculty will have access to network resources and services irrespective of the instructor's physical location on campus. Some applications, such as desktop videoconferencing and other bandwidth-intensive applications will require wired access. Common areas and classrooms can typically be supported by wireless access.

20. Hardware – *Equip each faculty member with a portable computing device and provide docking stations in office and instructional facilities.*

Faculty will be able to support the development and use of the instructional environment in classrooms and common areas, and from off-campus locations. Requirements for standardization, including identified vendor and baseline specifications, will be established for the cost-effective support of laptops.

21. Hardware – *Equip all classrooms with a docking station, display devices that support computer output, a VHS player/recorder, and a DVD output device.*

Networked resources and Internet access can expand the learning environment beyond the walls of the traditional classroom. Technology components will create a "smart classroom" that allows the faculty member to transparently integrate technology in support of the learning environment. Having a standard classroom configuration will encourage faculty to use technology in their teaching because instructors will not have to learn a different configuration for each classroom in which they teach. In every instance, the tools provided will be easy to utilize, reliable, and well maintained.

22. Hardware – *Equip some classrooms with two-way videoconferencing units, graphics cameras, and satellite broadcast reception to facilitate separate groups of students and remote instructors.*

Video technologies can support real-time instruction and interaction where required for on-campus instruction. This may include two-way video/audio applications, or one-way video with two-way audio applications. Instruction may be sent to remote sites and/or received from remote sites in support of distance learning programs as well as supporting gender-separated classes.

23. Hardware – *Support common access labs for curriculum-specific requirements as certain applications are best run from dedicated machines.*

The campus will support specialized hardware for some discipline-specific applications. These applications may support multi-media, computer aided-design and collaborative virtual environments. Attention will be given to processor speeds and adequate RAM to support the efficient deployment of such applications.

24. Hardware – *Provide network services that enable file and print sharing.*

Centralized hardware resources such as printers and file servers will be provided to support the use of laptop computers. These networked resources also will support standardized software deployment, file sharing and storage, and communication.

25. Software – *Provide current releases of industry standard office productivity and security software and provide timely update.*

Faculty will have access to widely adopted productivity tools to support curricular development and prepare students for the current working environment. Centralized software available via networked file servers will support appropriate maintenance and ensure timely update.

26. Software – *Facilitate access to discipline-specific software where appropriate.*

Specialized software that supports unique programmatic competency attainment and course curricula will be made available to faculty for the development and delivery of instruction.

27. Software – *Provide a course management system (CMS) for the delivery and/or support of all courses.*

Faculty will be provided access to software tools that support campus-based, as well as distance learning course development and delivery. The management system will allow faculty to provide student access to static resources such as course syllabi and assigned readings, as well as interactive resources such as software simulations. Interactive communications tools such as e-mail, discussion forums, real-time conferencing, and document sharing also will be made available for faculty use in support of instruction. Appropriate development tools will facilitate the development of resources, and management tools will facilitate the reporting of student progress. Training on the platform will be mandatory for all faculty.

28. Software – *Provide a Web-based environment that enables authorization and authentication services and provides access to indicated administrative systems, faculty service, the library, and the CMS.*

A Web-based interface will be created that will provide a gateway for faculty to access various academic and administrative services online. This type of access will be made available through Web services that allow for the integration of different applications and provide for secure data exchange between systems. A centralized directory service can facilitate single sign-on capabilities, allowing the university to personalize and customize services and resources for each faculty member. In selecting vendors for the PMU infrastructure, consideration will be given to companies that provide Web-ready front-ends for their products.

29. Support – *Provide a faculty development center to provide training and facilitate the development of technology-delivered and technology-enhanced instruction.*

A centralized faculty development center will provide access to technical and pedagogical training in support of technology-enhanced instruction. Focus on integration and assessment will support campus-based, as well as distance learning courses. The development center will provide services such as instructional design, resource identification, and learning resource development.

30. Support – *Provide helpdesk services that allow efficient self help as well as access to live assistance.*

The university's centralized support organization will provide access to helpdesk services and a mechanism for tracking the services it provides. Users should be able to self-diagnose common issues through the use of an online knowledge-base and a "frequently asked questions" area. Other assistance will be provided through e-mail and messaging. Intervention activities such as virus alerts and software updates also will be provided.

- 31. Support – *Facilitate access to hardware repair and maintenance.*** The difficulty of obtaining maintenance hardware on short notice in the Middle East makes it prudent to purchase premium maintenance hardware agreements for university computing equipment. These agreements should provide same-day, on-site repair guarantees for critical parts and next-day shipment guarantees for non-critical system components. Additionally, diverse applications and the specialized hardware they require necessitate a high level of proficiency among the university's support staff. When support is distributed across the campus at the department level, it becomes difficult to develop proficiency in specialized applications. The most effective arrangement therefore is to centralize support activities. This centralized support organization will have access to a change and trouble tracking system that lets it track and report incidents.
- 32. Security – *Provide the necessary security controls and systems to ensure as much as possible a safe network and computer environment.***
The necessary security components will be employed to ensure as much as possible that students, staff, and faculty all enjoy the most up-to-date security protection via centralized updates for anti-virus protection, O/S patches, firewalls, content control systems and other security methods.
- 33. Security – *Provide the necessary secure facilities to access PMU IT resources remotely.***
The university will facilitate remote access for students, staff, and faculty to its IT resources via the Internet, direct dial-in, or other necessary means, so that persons may work off-campus if they desire.

GOAL 4: Provide administrators with a cost effective, flexible, reliable, and secure IT environment that meets the business needs of the university.

The PMU core infrastructure will be designed in a fashion that allows the technology to support the applications required by faculty, staff, and students for the near future, in spite of unavoidable uncertainties. These uncertainties lie in not knowing which applications will be needed, how much bandwidth and computing power will be required, and how rapidly advances in technology will create obsolescence. The following strategies will result in the cost-effectiveness, flexibility, reliability, and security that the PMU requires:

34. Cost-Effectiveness – *Take advantage of economies of scale via standardization of hardware, software, and infrastructure.*

It is possible to achieve significant savings in both the cost of support and in increased effectiveness of applications by standardizing the computing environment wherever possible. A number of studies by industry analysts have demonstrated that standardization of hardware and software results in reduced requirements for spare hardware, fast response to support calls, reduced requirements for staff, and lower costs through volume purchases. While the individual requirements of diverse departments mandate some specialized hardware and software, these will be the campus exception and not the norm. There is always a temptation for departments to specify their own equipment and applications, but this detracts from the overall standardization efforts. The university will set standards for workstations, laptops, printers, operating systems, network operating systems, data base systems, and commonly used office automation software.

35. Cost-Effectiveness – *Leverage site licenses where applicable.*

For many of the same reasons that affect cost savings and operating effectiveness listed above, campus-wide site licenses will be pursued at least for operating systems, network operating systems, office automation systems, security software such as virus checking packages, and data base systems. These centralized site licenses can often lead to discounts of as much as 90% in education environments over departmental purchase of individual licenses. Centralization does, however, require better coordination of departmental needs and the tracking of software licenses. A centralized hardware and software inventory tracking system will be implemented along with an automated mechanism for automatically updating software revisions and applying maintenance patches on the network.

36.

37. Cost-Effectiveness – *Centralize support where possible.*

The diversity of applications that a campus must support requires a significant investment in support staff training. The higher the proficiency levels of the support staff, the more cost effective the support it can provide. When support is distributed across the campus at the department level, it becomes difficult to specialize in applications to increase proficiency. This centralized support organization will have access to a change and trouble tracking system that lets it track and report incidents.

38. Cost-Effectiveness – *Leverage vendor agreements to realize savings on hardware cost.*

As much as possible, the purchase process will minimize the number of technology vendors required to serve the university. This would allow the university to establish a customer/vendor relationship that would result in better support and lower costs.

39. Cost-Effectiveness – *Reduce overall storage costs by deploying a pooled storage solution.*

A centralized Storage Area Network (SAN) with Network Attached Storage (NAS) will be made available on a campus-wide basis. This would allow the use of very high density storage with a low cost per megabyte. It also would allow centralized tape backup which would increase overall reliability.

40. Cost-Effectiveness – *Provide reporting tools for effective executive management decisions.*

The high cost of IT and the ever-increasing demand for additional services make it important to implement reporting systems that monitor system usage and trends. This monitoring should include Internet bandwidth, CPU, memory and storage utilization of servers, local area network performance, and critical resources.

41. Cost-Effectiveness – *Facilitate relations with the local industry.*

Relations with local industry, especially large IT corporations such as manufacturers, will be encouraged and nurtured to the benefit of the university. Such relations will enable direct input from vendors, manufacturers, and large corporations to help facilitate the university's IT focus and growth. Industry relations also will provide avenues to potential job placement for PMU students.

42. Flexibility – *Use open source and/or open standards as appropriate.*

Open source software can be an effective tool for many university functions and will be considered wherever possible. It is especially effective in resource monitoring (see Strategy 39). However, whenever open source solutions are used, it is important to factor in the costs of providing university support for these non-vendor supported tools. These calculations will play a major role in determining the best final solution.

43. Reliability – *Provide redundancy for critical infrastructure and hardware components.*

Whenever possible, key network components, servers, and storage systems will be equipped to provide protection against failure and data loss. The redundancy will include power supplies, processors, disk controllers and mirrored disk drives.

44. Reliability – *Invest in comprehensive, premium service level agreements.*

The difficulty of obtaining maintenance hardware on short notice in the Middle East makes it prudent to purchase premium maintenance hardware agreements. These agreements should provide same-day, on-site repair guarantees for critical parts and next-day shipment guarantees for non-critical system components.

45. Reliability – *Provide data protection strategies including backup and recovery methods, mirroring, offsite data storage, and physical security.*

The SAN/NAS solution recommended above (see Strategy 38) will enable reliable data backup procedures. These systems will be coupled with documented procedures for storing copies off-site and periodically testing the backup recovery procedure.

46. Reliability – *Provide environmental conditions such as conditioned power, cooling, fire suppression, and other data center activities.*

The centralization of support and servers will reduce the cost of ensuring proper environmental protection. The central computer facility will include backup power that will support the critical systems for at least four hours, dual air-conditioning systems with temperature and humidity monitoring, card access for door entry, and dry chemical fire suppression.

47. Reliability – *Provide a quality of service process that incorporates traffic shaping, prioritization and caching that ensures specific application needs.*

IT organizations traditionally face an unlimited demand for information technology resources and a limited ability to deliver them. A Quality of Service (QoS) process therefore will be created that ensures delivery of critical information in a better than “best effort” fashion (the default Internet standard for packet delivery). One aspect of the process should include traffic shaping; this will control or limit non-critical traffic during heavy congestion periods, especially from student residence halls. A second aspect should be prioritization of traffic using tools such as Differentiated Services (diffserv); this will create separate priority queues through routers and switches for time sensitive traffic. The third aspect utilized should be caching of information that is requested repeatedly; this will assist in reducing the network load.

48. Security – *Provide appropriate security technology such as firewalls, IDS, IPS, content filtering, and physical access.*

Security tools will include firewalls that filter out potentially harmful and inappropriate traffic, intrusion detection systems that alert support staff of attempted unauthorized network entry, and intrusion prevention systems that eliminate attacks on known network vulnerabilities. Physical access security will include a centralized electronic card access system that logs all entries and controls access on a card-by-card basis.

49. Security – *Provide centralized authentication databases.*

A system for centralizing information about authorized users and automatically disseminating this information to all servers will be established. This centralized database will simplify the management process and reduce the likelihood of unauthorized access.

50. Security – *Provide an integrated architecture.*

The university's security and IT systems will work together to provide a highly integrated solution that ensures security and consistency in the manner in which PMU policies are applied to all users. Smart ID Cards and any other necessary and appropriate systems will be effective tools for access, security, registration, financial transactions, and other processes that require identification.

51. Security – *Provide end-user security training.*

A system will be established that automatically allows one password for each end user for all systems that the user is allowed to access. The system will ensure the use of secure passwords and require regular changes in passwords according to a schedule established by the PMU. The system will provide annual security training and login banners that provide security instructions.

52. Security – *Provide security screening for IT staff and major systems.*

A system will be established that would notify IT staff of any mandated security patches recommended by vendors for all operating systems and applications. In addition, IT staff will be subjected to criminal background checks to minimize the danger of theft of money and services.

GOAL 5: Provide technology tools to facilitate effective student support services.

Information technology can serve both to improve the efficiency of the PMU's student services through such means as self-service via Web interfaces and to create an environment in which students learn about the PMU, develop an affinity with university values, and communicate with support staff.

53. Student Support – *Create effective Web strategies to communicate and market the university to both internal and external audiences.*

The PMU Web environment will support the following activities:

- a) Current students will be able to use the Web for both academic work and for non-academic education-related activities such as seeking information about university business or communicating with administrators regarding university activities.
- b) Faculty and staff will be able to conduct regular university business via applications with Web interfaces.
- c) Prospective students will be able to seek and find information easily on the PMU's Web site, be able to navigate the site easily, and be able to get a sense online of the academic community.
- d) The university must be able to market its core values through a coordinated, integrated, and aesthetically pleasing Web environment.

54. Student Support – *Support management information system services.*

In order to minimize the duplication of data entry and for a smooth delivery of IT services, it will be essential that the university's MIS systems be integrated with other IT systems such as the course management system and the library system so that information gathering and delivery are seamless.

55. Student Support – *Support library services.*

In addition to the basic library services such as searching references, catalogs, and books, library systems must also have the ability to identify approved target populations when licensing restrictions of some of the content require such authentication. (This circumstance may occur, for example, in delivering journal subscription services and inter-library loans.) For services such as this, IT can play a crucial role in providing an integrated, secure, and authenticated environment.

56. Student Support – *Collaborate with other departments to deliver their student support services online, including academic advising, registration, degree audit, class schedules, campus calendar, housing information, online payments, bookstore, etc.*

Even though they are delivering different services to students, multiple departments will require access to the same integrated, secure and authenticated IT environment that only central IT can provide.

57. Student Support – *Use technology to create an online environment for student groups to communicate.*

In order to prepare students for the world in which they will be living and working, the university will promote the use of an electronic communications environment for students to communicate among themselves. This environment may include e-mail, mailing lists, chat rooms, PC based videoconferencing, instant messaging, and other emerging technologies such as unified messaging for students to communicate among themselves when allowed under the PMU's gender-separation policies.

GOAL 6: Provide an IT governance structure that includes university faculty, students, and staff, as well as industry in a collaborative environment.

Information technology at the PMU will be designed to serve the needs of faculty, students, and staff. Without effective communications with those constituencies, IT cannot know the needs of each group. Also, it is important that each of these various groups feels able to meaningfully participate in decision-making about the strategies and goals of IT on campus.

58. Governance – *Create policy and IT governance councils with membership from all major constituencies on campus.*

An IT infrastructure can be built and operated in a number of ways. In almost any environment, however, certain difficult policy decisions may need to be made. Procedures must be established, for example, to protect the infrastructure from an increasingly hostile electronic environment. The delivery of key IT services will also require the training of faculty, staff, and students to operate in such an environment. An ongoing dialog through policy and governance councils will allow IT administrators to communicate with their different constituents on the challenges faced and the decisions made.

59. Governance – *Create a set of operating policies for information technology operations that includes IT security policies.*

It will be essential to establish a set of uniform operating policies to ensure that all responsible persons at the PMU have access to the same set of standards and practices required for the IT environment. Policies will be established concerning issues such as the use of virus protection software, the necessity to keep abreast of security patches, and the responsibilities of each PMU student, faculty, and staff member to protect the computing environment.

60. Governance – *Facilitate IT related special interest groups.*

The IT organization will leverage the skill sets of its staff and the university faculty to promote the activities of groups with interests in specific areas such as geographic information systems, graphics, and computer science based groups.

61. Organizational Structure – *Create a centralized, CIO-based IT structure, based primarily on a functional organization, but which will allow the creation of matrix-style work groups based on IT project needs.*

As the role of technology has permeated all aspects of organizations, including education, in the last 10 to 15 years, the CIO (Chief Information Officer)-based structure has proven to be an effective means of IT organization. Having a high-level official who interacts with the chief academic and administrative officials ensures that the IT infrastructure is directed to achieving university-wide goals and that IT is considered a full partner in the academic enterprise. When needs arise that require cross-departmental cooperation (such as when a new budgeting system is selected and implemented) work groups that include both IT personnel and users from departmental staffs can be formed on a temporary basis to work cooperatively.

62. Staffing – *Create a recruitment and retention strategy that attracts highly qualified IT employees.*

Major IT decisions can be transformed into successful applications and systems only by highly skilled IT staff. A lack of a coordinated plan to recruit and retain highly qualified IT staff will lead to a drain on resources and potential inability to deliver reliable services.

63. Staffing – *Create a higher level of IT training that helps to update the skill sets of IT employees as technology changes.*

As the lifecycle of technology continues to grow shorter, it is extremely important that IT staff are afforded the opportunities to stay abreast of current and emerging technologies. In the long-term, such an advanced training program will help create a more viable computing environment for the entire university.