

Annual Update –
September 2008

The College of New Jersey
Information Technology White Paper



Table of Contents

INTRODUCTION	3
EXECUTIVE SUMMARY	5
INFORMATION TECHNOLOGY ADMINISTRATION	6
STRATEGY DEVELOPMENT	7
ENTERPRISE RESOURCE PLANNING (ERP) IMPLEMENTATION	7
ACADEMIC COMPUTING	7
ACCESS AND INFORMATION MANAGEMENT	7
IT GOVERNANCE	8
INFORMATION TECHNOLOGY PROFESSIONAL STAFF DEVELOPMENT	8
ENTERPRISE APPLICATIONS.....	9
SA IMPLEMENTATION	10
EMPLOYEE INFORMATION SYSTEM - EIS.....	10
FINANCIALS.....	11
THE HUB	11
LEGACY SUPPORT	11
TRAINING	12
USER SUPPORT SERVICES	13
HELP DESK SERVICE MANAGEMENT	14
VIDEO CONFERENCING SERVICES	14
STREAMING VIDEO.....	15
COURSEWARE RESEARCH.....	15
COURSE ASSESSMENT AND ACCREDITATION	16
TCNJ PORTAL.....	16
E-GRANT APPLICATION.....	17
SUMMER COMPUTER UPGRADE.....	17
NETWORKING & TECHNICAL SERVICES	19
UPDATING CAMPUS TELECOMMUNICATIONS STRATEGY	20
MAINFRAME RETIREMENT	21
WIRELESS NETWORKING.....	21
NETWORK SECURITY.....	22
INVESTIGATION ON OUTSOURCING EMAIL	23
DISASTER RECOVERY/BUSINESS CONTINUITY	25
IDENTITY MANAGEMENT	27
OPEN STANDARDS.....	27
NETWORK CORE INFRASTRUCTURE.....	28
NETWORK BANDWIDTH MANAGEMENT	29
VIRTUALIZATION.....	30
THE VIRTUAL DESKTOP	31
APPENDIX	33
IT STRATEGIC PLAN	34
WIRELESS SCHEDULE.....	40
PROJECT PLANS 2007-2008.....	41
2008 ACADEMIC COMPUTING ADVISOR FINAL REPORT	44

Introduction

Information Technology at The College of New Jersey is comprised of four separate but highly integrated operating units: Enterprise Applications, Network and Technical Services, User Support Services, and an administrative layer called IT Administration. This document contains the strategic plans for each of these units, and various documents that support and explain the rationale behind those plans.

While each of these units is charged with handling a separate aspect of Information Technology at The College of New Jersey, Information Technology uses the method of integrated planning described below:

1. The director of each operating unit creates a white paper that outlines the strategic plans and goals for the upcoming year. These white papers are compiled, along with supporting documentation, into one overall IT white paper. This white paper is then reviewed by each of the directors and the Vice President for IT and Enrollment Support Services for accuracy and completeness.
2. The white paper is then presented to Cabinet to solicit input regarding projects that have a major budgetary impact and/or have a major impact on the college's strategic initiatives and technology infrastructure. This input will assist in further clarification of the scope of the items in the strategic plan and the impact on The College community as a whole.
3. Taking into account the feedback from Cabinet, the IT directors will develop a detailed project plan for the upcoming year (see "Information Technology FY2007-2008 Project Plan" in the Appendix for last year's plan). This detailed project plan is reviewed by the directors and Vice President for IT and Enrollment Support Services, and widely distributed within IT, as well as to any department that is included as a resource or impacted by these plans.

The allocation of the IT budget for the upcoming academic year is guided by this process, which allows for input from the various operating units and the leadership of The College.

As an overview of the interplay of the various operating units, a brief description of each follows:

IT Administration:

This team of central staff works to develop the structure that guides the various IT departments as they develop short and long term goals. This group leads the initiatives to replace our core administrative systems and provides the project management of these implementations. Included in this group is the Vice President for Information Technology and Enrollment Support Services, the SA Project manager, and the Assistant to the Vice President for Information Technology and Enrollment Support Services.

Enterprise Applications (EA):

Enterprise Applications (EA) provides large-scale applications that support the day-to-day administrative work of the college. This area is responsible for maintaining integrated enterprise systems that support the business of The College. Enterprise Applications develops and implements new systems, customizes packaged software and produces reports based on the enterprise data for the campus community.

Networking and Technical Services (NTS):

Networking and Technical Services is responsible for The College's communications infrastructure including the cabling, electronic equipment and termination equipment needed to deliver voice, data and CATV. NTS provides for the back office server needs of The College's faculty, staff, and students, including file and application sharing (Novell), email capabilities (UNIX), and other network driven applications. In addition, NTS provides technical support for mainframe based enterprise applications.

User Support Services (USS):

User Support Services provides support for computer workstations and peripherals, media equipment and instructional technology to the campus. USS includes Computer Support Services (Help Desk, Training, Repair and Distribution Facility), Media & Technology Support Services, Instructional Technology Services, the Web Development Team, the Support Specialists, the computer labs and RES.net. The service theme for this area is *"User Support Services is committed to providing quality service through implementing technology focused solutions for the entire campus community."*

Executive Summary

The upcoming year focuses on business continuity planning, new system implementations and existing system upgrades along with upgrades to our infrastructure. Overall, the individual projects combine to:

- Provide a phased implementation of a new student system (SA) which will allow for the eventual retirement of the mainframe
- Consolidate College resources through virtualization of hardware and consolidation of software programs
- Develop a needs assessment, evaluation and replacement plan for an aging telecomm system
- Continue replacement of our core network system which will provide redundancy and reduce network downtime
- Expand wireless access on campus
- Improve network security using technical solutions
- Improve data security using technical and educational programs

Details for IT projects can be found in this document.

Information Technology Administration

Prepared by: Nadine Stern

VICE PRESIDENT FOR INFORMATION TECHNOLOGY
AND ENROLLMENT SUPPORT SERVICES

This team of central staff works to develop the structure that guides the various IT departments as they develop short and long term goals. Many of these goals are continuous and ongoing, some are issue specific or project related. This year, the major categories and goals are:

Strategy Development

In concert with the changes in the overall campus approach to planning, strategy and assessment, refine the IT strategic plan, and create a process to update and assess its effectiveness. (See “IT Strategic Plan” in the Appendix)

Enterprise Resource Planning (ERP) Implementation

Continue to coordinate the implementation of the Student Administration System focusing this year on Student Financials, Financial Aid and the Academic Advising modules.

Academic Computing

Continue to support the collaborative efforts between Academic Affairs and IT in expanding the role of the Academic Computing Advisor. This Advisor is a faculty member who serves to advise and inform IT about issues pertinent and important to faculty and students. The Academic Computing Advisor serves a two-year term. Dr. Lynn Braender from the School of Business has completed her first year as Academic Computing Advisor. Dr. Braender continued the work of the previous Academic Computer Advisors, served on various established and new committees regarding technology at TCNJ and introduced new ideas relating to emerging technologies, emerging ethical issues and student expectations. (See “2008 Year End Academic Computing Plan” in the Appendix for Dr. Braender’s year-end report)

Access and Information Management

IT has several projects in varying stages focusing on Access and Information Management as well as committees to focus on data privacy, data protection and security. IT continues to work to insure that our data is secure and our campus is educated in the protection of data by focusing on the continuation of initiatives including:

Identity and Access Management

Collaborate with Network and Technical Services to refine the business processes and technical procedures related to authentication, authorization and access management, including account creation, changes, removal, and limiting the use of Social Security Number. A proof of concept for an Identity and Access Management system is currently being developed by Networking and Technical Services staff.

Data Security and Data Privacy

Form an IT Security Team. Members from each of the areas in IT meet on a monthly basis to identify areas for improving security and to develop a comprehensive plan for future initiatives to enhance data security on campus.

A complement to the IT security team is the data privacy team with representatives from various departments across campus to review data security at The College of New Jersey and make recommendations for improving data security within their own departments and to the campus as a whole. As the IT security team recommends potential data security initiatives, we will enlist the data privacy team to help with the evaluation and implementation of best practices in data security for TCNJ.

IT Governance

ITPC (Information Technology Planning Council)

Work with ITPC to identify an effective ongoing methodology to examine existing IT policies, procedures and guidelines, revise as appropriate, and determine additions as necessary. Determine other appropriate and effective goals and outcomes for the work of the council.

Information Technology Professional Staff Development

Create and support a staff development model for IT staff that is accessible to all staff, cost effective and provides for continuous technical and non-technical training. It is essential that we provide adequate training for our staff that allows employees to perform their responsibilities, to progress in their careers and to reduce employee turnover.

These goals taken in tandem allow the IT administration to move forward with planned improvements at The College of New Jersey in a measured, managed fashion as we continue to improve the focus, coordination and cooperation of all Information Technology operating units while supporting the President's vision of strategies to support the College in its integrated transformation.

Enterprise Applications

Prepared by: Pamela Singh

Director of Enterprise Applications

This year, the major categories and goals for Enterprise Applications are:

SA Implementation

We recently completed an upgrade to the SA system from version 8.9 to version 9.0. The plan was completed in July 2008 in anticipation of our Phase 2 SA implementation in consultation with CedarCrestone. In this phase, we will roll out Student Records, Academic Advising and Student Financial Services by the Fall of 2009.

In coordination with the SSN elimination project, a search/match process was developed that is used within the application as a means for users to search both the Human Resource (EIS) and student (SA) systems for existing emplids when recruiting and registering students. In order to minimize the duplication of emplids, a nightly feed from the existing student system is exported to the SA system for the creation of an emplid which is then stored in the HUB and the student system. Emplid is the unique identifier created in the Oracle/Peoplesoft systems.

Business Objects is the reporting tool that has been selected to work in conjunction with our ERP systems. This will provide greater ad-hoc capability for users and will allow for more complex reports to be developed by users. Business Objects has been installed and will be implemented in conjunction with the SA project.

Employee Information System - EIS

The upgrade from PeopleSoft 8.3 to 8.9 was completed in March 2007. Post upgrade projects have included adding positive pay functionality for payroll and implementing workflow in 2 areas. Delivered workflow for address changes was implemented resulting in appropriate departmental notification when an address is changed with the application or by a self-service user. A custom workflow was developed and implemented to notify the appropriate departments (payroll and benefits) when an employee is placed on leave or returns from a leave of absence.

In conjunction with SSN elimination efforts, a search/match process was developed that is used within the application as a means for users to search both the Human Resource and Student systems for existing IDs when hiring employees. The same process is used within the interfaces used to load adjuncts and student workers in order to minimize duplication of IDs across systems. Also in conjunction with SSN elimination, emplids are now populated within the HUB for all employees and students. Emplid is the unique identifier created in the Oracle/Peoplesoft systems.

When The College implemented the Emergency Alert Notification System, EIS became the source for employees' text alert and voice message information. This information is extracted from EIS daily and sent to the vendor.

Finally, the Business Objects program that was selected as a reporting tool for the SA project will also be used for report generation in EIS.

Financials

In anticipation of the upgrade of Financials to 9.0, little new development has taken place in the current PeopleSoft application. We have, however, implemented the delivered positive pay functionality and added an automated bank reconciliation process. The upgrade to 9.0 will give us the opportunity to create direct communication between the Financials, HR and Student systems reducing the number of interfaces we currently use to pass data from system to system.

An RFP for an Oracle/PeopleSoft 9.0 implementation has been distributed to 10 vendors for their review and proposals for completing the implementation. The responses will be reviewed and candidates will be selected for presentations of their proposals. The campus reporting strategy will be addressed as part of the re-implementation process. The RFP includes reviewing the current strategy using Oracle Reports for campus-wide reporting and determining if we should continue with it or develop a new reporting system with greater ad-hoc capabilities.

The HUB

An important component of strategic planning has been the enhancement of security. Two major projects this year are the elimination of the SSN as an identifier for 3rd party systems and the separation of the NET Ids from email addresses. Both projects are in process and upon completion, will render our systems less vulnerable to security breaches and phishing.

The HUB was created as an interim storehouse for biographical data, EIS and SIS primary identifiers, email addresses, SSNs, and other necessary information until a single id independent of the SSN could be created. With the implementation of the security enhancement projects, the HUB will continue to serve as the clearinghouse for biographical and demographic information through a nightly feed to third party systems such as T2, the Account Management System and BlackBoard Universal without using the SSN as an identifier. A web front end provides access to this information for the administrative offices. This enables the offices to indirectly locate SSNs through the use of other identifiers.

Legacy Support

The support to the existing mainframe system is ongoing until we replace all our existing mainframe systems. We continue to maintain and update the current SIS system. We upgrade the SIS system twice a year by applying fixes and upgrades delivered by the vendor. We are also providing new functionality for the students and departments to support their business practices and provide the students with user friendly web based applications. This year, for Student Affairs, we electronically placed first year students in rooms and buildings for the freshman seminar class. We also developed an electronic first year placement notification providing first year students with housing and roommate information. In conjunction with the SSN elimination project, we masked the first five digits of the social security number and the year in the birth date. These changes are also incorporated into the SA system by the SA implementation team.

Reporting

Business Objects has been selected as the SA reporting tool and will be implemented in conjunction with the SA implementation. This reporting tool will be used to provide a simple and reliable reporting environment to the campus community to develop reports that meet the needs

of business processes. The reporting tool will also provide an assortment of extraction tools to match the reporting needs and skill sets of the various cohorts. EA along with the reporting implementation team is developing a proof of concept to explore whether the different extraction methodologies and preservation of data will be possible in the new reporting environment. The reporting tool will support the development of simple to mildly complex reports by business analysts and some functional users, and the more complex needs will be developed by the technical team.

Training

Enterprise Applications is following the development blueprint to ensure that EA stays current and efficient and maintains a workforce that is knowledgeable and flexible in its support of enterprise applications and also professional in its interaction with the campus community. All of our staff have completed the basic training in Oracle/PeopleSoft development environment. They are developing simple programs to practice their new skill sets. The staff has attended professional development seminars to learn how to better manage and prioritize multiple tasks. This year much research has been done to bring the JAVA tool set into the development environment. In the next year, the staff will be trained in JAVA and the hope is to develop at least one application using this language.

User Support Services

Prepared by: Jeffrey Kerswill

Director of User Support Services

This year, the major categories and goals for User Support Services are:

Help Desk service management

There are several initiatives that will assist with providing more effective helpdesk services to the campus including expanding the use of service management and remote assist processes.

Over the next year, we will:

- Increase the use of the remote assist program. Remote assist capability has increased our first call resolution effectiveness and user feedback following the use of remote assist for problem resolution has been overwhelmingly positive. Increased visibility and training to help foster the use of the product is necessary.
- Transform the Help Desk website into a more effective self-assist portal, with the goal being to give clients access to a well managed knowledgebase including the ability to submit service requests online. The information made available to clients should be easy to navigate/search and include current technical documentation, FAQs and instructional videos.
- Continue to integrate existing asset management services (Zenworks) into our on-line trouble-ticket and asset management system. Currently, we are importing active asset information from Zenworks, however, we don't currently use this information for reporting.

Working with the web development team, we will begin to evaluate the feasibility of developing an in-house service management system that will incorporate all processes. In addition, we will take a look at other processes and systems such as purchasing and licensing to evaluate the potential for incorporating these. In the end, we hope to provide clients with access to information that is accurate, current and organized resulting in a more effective problem resolution processes.

Video Conferencing Services

TCNJ presently has 3 two-way video conferencing systems:

- A permanent installation in Kendall Hall 133. This room is ideal for applications such as distance learning and employment searches, with seating and audio reinforcement for about 15 people, two cameras to show users in the seating area, as well as a presenter in the front of the classroom. For ease of use, it is controlled by a color touch screen interface. The Tandberg 3000 Videoconferencing CODEC has both 384k ISDN and 1.5MBPS IP connections, which allows for direct calling to other systems over ISDN or IP, as well as calls to other members of the NJEDge video network and Internet 2 clients over NJEDge.
- A portable Tandberg 1000 videoconferencing unit which is ideal for single participant video conferences, as all the equipment is contained in a flat panel video screen. This system is capable of IP connectivity only and can connect to clients directly or via NJEDge.
- A portable Sony PCS-1 videoconferencing unit which connects to an external monitor, projector, etc., and supports multiple microphones, which makes it better suited for larger

groups, classroom or meeting use. This system is capable of IP connectivity only and can connect to clients directly or via NJEDge.

Conferencing services can be a labor-intensive, technical service to provide. Planning for the increased use of conferencing services would include additional staffing. In addition, the technology can be a bandwidth “hog” and allocations should be monitored carefully. The equipment currently in use has enough flexibility to allow conferencing services to be available at most campus locations and events.

Future consideration may be given towards high definition video conferencing services, however, the current demand does not warrant the cost of the additional infrastructure.

Streaming Video

One way streaming video can be accomplished is by utilizing our VBrick Video Appliance. The Vbrick supports the streaming of Composite or S-Video and audio in MPEG4 video both on and off campus to as many viewers as bandwidth will allow. Video can be played back on Windows and Mac computers in standard players, such as QuickTime. The VBrick can also send DVD Quality MPEG2 video across the campus network to a single other location. Theoretically, MPEG2 can be sent to as many sources as bandwidth will allow over a multicast-enabled network. This unit is for one-way video applications, and could be used to webcast live events or stream pre-recorded events (for example, from a VCR or DVD player) to the web or campus network. The type of event and technology being used would dictate bandwidth requirements. Fortunately, the equipment currently in use has enough flexibility to allow streaming services to be available at most campus locations and events.

Courseware Research

Over the next year, Instructional Technology Services will research open source courseware packages and compare these products to SOCS (Simple Online Courseware System), our current courseware system.

Every software package has a life cycle. The life cycle for SOCS may be coming to an end as technology is changing. Current trends in web development are moving the field in a more dynamic environment and service oriented architecture. This allows applications to be more agile and portable and allows for easier application interfaces. Although SOCS could be modified and patched to meet the upcoming needs, the process may grow cumbersome and will slow overtime.

Currently, two reliable open source packages exist. We will install these systems and will compare usability, customizable features, ease of maintenance and desired features. Overall, these systems will be evaluated taking into consideration the ability of the Instructional Technology Services and Web Team staff to redevelop SOCS using current technologies. The issue of data conversion will also be investigated. Since SOCS is a homegrown system, there may be issues with transforming the data to conform with another system.

Costs will also be evaluated. Several consulting groups have emerged over the years that focus on the implementation of these types of systems. Training and other costs may be a factor depending on the conclusions made.

Changing from SOCS to an open source system will require buy-in from the academic community and the community needs to be directly involved with the decision. Using an open source system could possibly give us a framework on which to base our own software. We can then rely upon the open source community for features and support. In comparison, building our own system would allow us to remain flexible and quickly add features. We would not need to rely upon the open source companies for updates. Researching these options will open up TCNJ's courseware opportunities.

Course Assessment and Accreditation

With the high level of detail and data required for assessment and accreditation for the various schools on campus, the demands for software support in this area continues to grow each year. IT has become increasingly involved with the implementation of technology to support the accreditation needs of the schools at the College.

This past year has seen great growth in the amount of assessments being tracked via SOCS. The Instructional Technology Services area, along with the Web Development Team, collected student data from our SIS system and merged this with data collected via assessments in SOCS in order to support the needs of the NCATE accreditation team in the School of Education. A system was also developed to collect standard test scores from ETS. This data collection is still continuing and will continue even after the NCATE accreditation is complete. ITS is working to automate the setup of these assessments as much as possible as it now takes several days each semester to setup and maintain the proper assessments.

Because of the growing needs of assessment on campus, IT has formed a group with Institutional Research called the Faculty Data Group. This group is focused on evaluating the assessment needs of the various schools on campus and educating members of these schools on the tools the College owns to help them gather data. The ultimate goal is to provide a tool that may be used campus-wide. Reaching this goal will allow IT and IR to offer consistent support and will save the College from funding various software packages for each school. Using one system campus wide would save time and effort over the prior paper processes. If the majority of schools use the same data collection technologies, a higher level of support, accuracy and consolidated reporting could be provided.

TCNJ Portal

Working in conjunction with Public Affairs, the Web Development Team is developing a homegrown portal system that will allow the TCNJ community to access their email, calendar, ERP systems, and other homegrown systems via single sign-on. We will also display prominent TCNJ news and events as well as campus alerts.

The portal will consist of both tools and widgets which will allow users to personalize their experience by customizing the portal to include only the information they want to see. The tools will consist of single sign-on connections to our primary and secondary web systems (Zimbra email and calendar, PeopleSoft SA, SOCS, Form Genie, etc.). Widgets will be more visual and will display the weather, news, GPA calculator, and TCNJ Events.

The TCNJ portal will be modeled after the iGoogle and PageFlakes portals. Using the PHP scripting language along with the Prototype.js and Scriptaculous Javascript libraries will allow the portal to take advantage of AJAX technology. This will make the portal extensively more dynamic and agile compared to most commercial portals.

The Web Team and Public Affairs have worked together to reach different TCNJ Communities across campus and include them in the research and testing. Once implemented, the portal will serve as an internal homepage, allowing our current homepage to be reserved for marketing and public communications. Current plans are to have the portal in production for the spring 2009 semester.

If successful, the portal will increase the amount of TCNJ communications that are read while also creating a more inviting web presence for the TCNJ community. It will be a tool that can increase its usefulness over time as more features and information are added.

E-Grant Application

The current grant administration software, ERSPA, was created in 2002 for the Office of Academic Grants and Sponsored Research (OAGSR). This application was one of the first developed by the Web Development Team. The system has since outlived its life cycle and needs to be rewritten.

The Web Development Team is currently partnering with OAGSR and several faculty members to design a new system. The system will encompass a project based design and include the appropriate workflow to enable OAGSR and the academic administration to properly track and approve incoming grant applications.

The budget development process will also be rewritten with the intention to include ways to export the information into popular grant web sites such as the National Science Foundation and the National Institute of Health. The pre-award portion of the system will be completed for the fall of 2008 while the post-award section will be completed at a later time.

Buy-in from the faculty is critical for this process. Once completed, the system will make applying for grants simple and attractive. The more usable the application, the more likely faculty are to use it. This will help give OAGSR more accurate data and allow for easier tracking of current grants. The Office of Budget and Finance will then be able to utilize the post-award side to track the spending of funded grants and reports due back to the funding agencies.

Summer Computer Upgrade

This year, User Support Services replaced over 350 computers across campus. A manager from the Support Specialists and a full-time staff member from the Computer Support Center served as project managers and identified the machines to be replaced, the replacement schedule, and prepared the documentation required. This is a continuation of IT's 4 year replacement cycle for desktop pc computers. The process is a multi-step process each year and includes the following steps:

Training:

The project managers prepare a one day training session for all full-time staff and student employees participating in the Summer Upgrade project. They review the entire process and set the expectations and goals for all those that are involved.

Preparation:

Each new computer is unpacked and prepped with a current standard image. The machines being replaced are first backed up using the Novell DNA process and then disconnected. All specialized software is noted at that time.

Installation:

The new computers are setup and connected. The DNA process is then run to reload the user's data. All college-owned specialized software is reinstalled as necessary.

Decommissioning:

Computer images are created for each of the machines being replaced. The hard drive of the decommissioned machine is then formatted to wipe out private data. The machine is reimaged with the standard image and may be re-deployed to replace aging student employee and general departmental computers.

Networking & Technical Services

Prepared by: Shawn Sivy

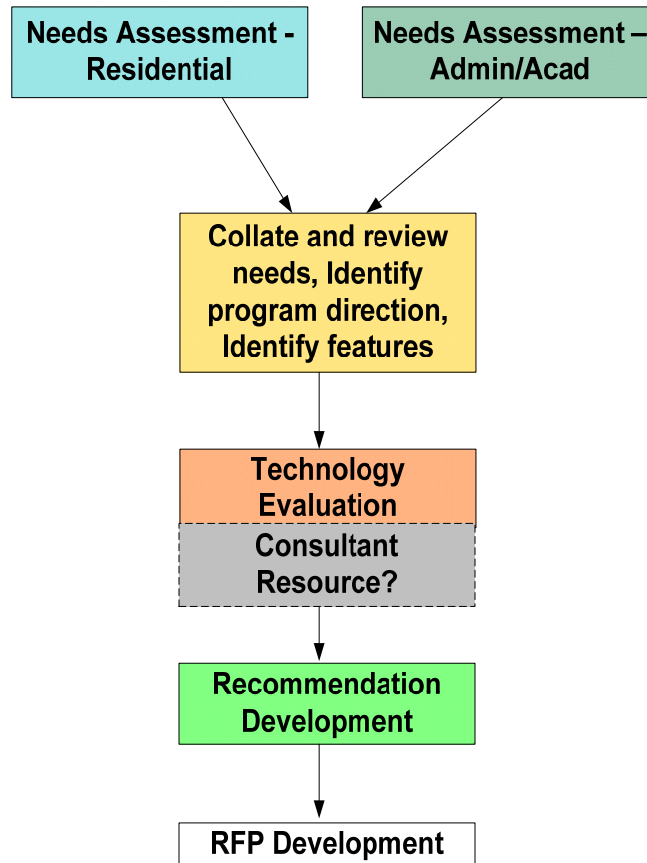
Director of Networking & Technical Services

This year, the major categories and goals for Networking and Technical Services are:

Updating Campus Telecommunications Strategy

The College has begun the process of evaluating the telecommunications needs of the campus. Once the needs of the campus have been captured, a technology that will meet those needs can be selected and finally, a timeframe for implementation can be determined.

The needs assessment process is described in the flow chart below.



Selecting a technology direction without a proper needs assessment could result in a solution that does not meet the requirements of the client-base and could result in expensive and unnecessary facilities infrastructure upgrades. Without planning and campus participation, selecting a voice solution may miss the safety and communication needs of the campus. At some time in the future, a decision will need to be made and **staying on the current path may result in expensive voice upgrades** for the campus that may not provide the best solution for the future.

With proper planning and campus participation, a voice communications plan that has campus buy-in will result. This plan will also allow IT to select a technology solution that is both cost conscious and meets the campus needs.

See the timeline below for the different phases of this project:

2008					Assessment- Residence					Assessment-		
2009	Acad/Admin			Review	Consultation			Review	Recommend			
	J	F	M	A	M	J	J	A	S	O	N	D

Mainframe Retirement

The College maintains an IBM Enterprise Server 7060 H30 (aka mainframe) to run its ERP application. Over the past several years, all but the student system have been moved off this server to multiple open systems servers. The student information system (SIS) is the remaining ERP application on the mainframe. **In addition to the SIS system, the Enterprise server is still used to process student evaluations, scan tests and HR timesheets.**

IT has put together a plan to address the retirement of the mainframe that addresses the need to find alternatives for the remaining systems on the mainframe, as well as the need to access historical data. It is essential that the retirement plan account for all systems and data currently residing on the mainframe. It is also essential that everyone that has data still residing on the mainframe be made aware of the impact of the retirement plan. This means that **legacy data may need to be converted to an accessible format** if the data is needed beyond the retirement date.

As part of the mainframe retirement plan, **maintenance contracts** will systematically be **eliminated to save funds**. When the mainframe is finally shutdown for good, there may be some resale value left in the unit, at least enough to pay for its removal.

Wireless Networking

The College has been slowly and strategically deploying a Wireless Local Area Network (WLAN) over the past few years. Unfortunately, **budget constraints have slowed the spread** of wireless installations. The most difficult parts of a wireless installation are the initial site survey and the cabling needs. Wireless networks still require wired connections at some level. Once the wireless traffic reaches the access-point it needs to be transitioned to a wired network. Typically access-points are installed at or near the ceiling where existing data connections are not likely to exist. Either the facilities department or a communications contractor is needed to install the necessary cabling. **The initial site survey to determine the proper locations for the access-points can be time consuming and may require a professional site survey.**

While the College has been **deploying wireless in a “hotspot” fashion to reach the most common gathering locations** (e.g. the library, student center and dining areas), it is expected that at sometime in the future almost all locations will have wireless coverage. The new 802.11n standard will provide for greater coverage area per access-point in addition to greater bandwidth

(about 4X) over the air. The 802.11n standard is expected to be ratified in 2008. The College continues to budget for additional wireless location on campus and will start planning for the next wireless network upgrade that will include 802.11n and wireless mesh networking. Wireless mesh will allow for the installation of wireless access-points without the need for a wired network connection. Mesh networks are typically deployed in an outdoor setting such as a parking lot or to cover other open areas. A power source, which could be for example, DC voltage from a lamp post, will still be needed.

WLAN technology is still maturing and some wireless standards are still a work-in-progress. For technology implemented now, you can **expect to refresh wireless technology/hardware every 3 to 4 years** for the foreseeable future. Vendor consolidations are still occurring, so selecting an established vendor is crucial. **Installing wireless everywhere now may not be the best use of College funds.** The “hotspot” technique is probably the best use of College funds until there is a critical mass of wireless installations and usage to justify filling the remaining “holes” in the wireless coverage.

Wireless local area networks provide network ubiquity. There is no need to find a data jack to be “connected.” For most common applications (web browsing, email, instant messaging, etc.) wireless networks work well. Integrated cellular and WLAN phones are starting to emerge. Wireless innovation is moving along quickly with better coverage per access-point as well as increased bandwidth. For at least the next few years, however, **wireless should be seen as a complementary technology to wired Ethernet** because of limitations in coverage, radio interference and bandwidth issues.

Network Security

At one time most threats to a network came from the outside (i.e. the Internet) so firewalls, intrusion detection devices and other scanners were placed between the network and the Internet. In a College campus, there are **now many threats that can initiate from inside the network.** Besides the disgruntled employee or student hacker, lab computers, student computers or employee computers can pose a danger to the campus network infrastructure if they have been **infected with “bots”, viruses or worms.** They **could send sensitive data** from infected machines to sites off-campus because firewalls are usually configured to allow most outbound traffic. Bots could **allow off-campus hackers to take control of a campus computer** (called a “zombie”), that regularly checks off-campus sites for instructions on what to do next. Finally, students are curious and **hacking tools are easier than ever to obtain.**

For these reasons, the College **needs to implement security measures inside the network**, not just at the gateway to and from the Internet. These can range from internal firewalls and intrusion detection & prevention (IDP) systems to a full-blown **network access controls (NAC)** system. Firewall and IDP devices would normally be placed at strategic locations on the campus network such as between the Internet and the campus network; between the residential network and the main campus network; and between the computer room/server network and the rest of the campus network. The College currently has a campus firewall & IDP to protect against Internet threats, an internal firewall to control access to our card services & building management network and an IDP device between the residential network and the main campus network. Another IDP to protect the computer room servers will be installed.

The College had a successful network security audit done by the Office of the State Auditor. Because the College uses a “defense in depth” strategy, it was able to fend off attacks via multiple methods. The “defense in depth” strategy involves having multiple layers of security installed. While the College utilizes firewall and intrusion detection devices at our Internet connection, it also has intrusion detection and switch access control lists inside the network. Host-based firewalls are also installed on servers and critical workstations. This type of configuration is considered a “best practice” by many security organizations such as the SANS Institute. Another emerging trend in higher education is the creation of a new role for managing IT security and TCNJ hired a Manager of IT Security in 2007.

The College is also in the research **phase of looking at NAC solutions**. A NAC solution authenticates and authorizes a user or device before it is allowed to access the campus network. As part of the authorization phase, a NAC solution will usually check the device **to make sure it meets a minimum set of requirements**. These requirements usually include a certain **OS patch level** and the **presence of anti-virus software** with up-to-date virus signatures. The roll-out of a NAC solution is not trivial, and NTS continues to investigate solutions that can be implemented with minimal end-user interruption and retraining.

Without internal network security protection the College network could **be exposed to threats that disrupt the network and expose sensitive data**. If VoIP traffic is put on the campus data network in the future, **it will be important to protect the VoIP server and the network infrastructure to minimize voice communication outages**.

With a thorough network security system in place, the **College will be able to control, prioritize and identify** types of traffic flowing over the campus network. The College will be able to secure its network infrastructure and servers from an ever-growing number of network-born threats. Finally, **in the event of a security incident, there should be sufficient logs available to identify its origins and prevent similar future incidents**.

Investigation on Outsourcing Email

Email outsourcing has become a popular trend at many colleges and universities. Google and a handful of other companies provide “free” email hosting, and many articles have been written about the subject in Chronicle articles and Educause discussion lists. This section will discuss TCNJ’s position with regards to email outsourcing. Google’s Apps for Education will be used in the examples when discussing outsourced email.

TCNJ currently uses the Zimbra Collaboration Suite (ZCS) to provide on-site email, calendaring, address book and (soon) tasks lists to current students, faculty and staff. TCNJ currently does not provide alumni with email accounts. The cost to provide students with an email license is about \$1.50 per student per year. Faculty and staff licenses cost \$8 per employee per year. The college had some initial hardware costs for servers and storage along with annual hardware support costs. While there is staff dedicated to supporting the Zimbra email/calendar application suite, there is not a full-time person dedicated solely to its support.

Challenges

While the “free” cost of a hosting service, both in user fees and hardware requirements, seems compelling, there are some challenges that must be understood. Some simply need to be discussed and their consequences understood, while some may be more difficult to overcome. These challenges are discussed below.

- Compliance with legal requirements such as FERPA, GLB, OPRA, e-discovery and section 508 (accessibility) are issues. The first few would most likely affect the outsourcing of employee email, not student or alumni emails. The accessibility issue would affect all groups. TCNJ IT understanding is that the Gmail webmail interface is not section 508 compliant. In order to provide archiving or backups for e-discovery or OPRA requests, one cannot use the “free” version of their product and must use the pay version. In the online discussions that were reviewed, many of the schools who have outsourced their email have done so for students and alumni only.
- The College’s “email as official means of communications” may need to be reviewed. Currently, if the delivery of a message is questioned, the TCNJ IT staff can review the email logs and the user’s email account to determine the delivery status of the message. In an outsourced model, TCNJ IT would not have access to the email logs of the provider and would not have a way to non-disruptively access to the user’s account. For the same reason, TCNJ IT would not be able to investigate why messages are not being delivered, such as when incorrect filter rules are applied or by spam filters.
- There are no email/calendar backups. Google does not back-up their email servers except for disaster recovery purposes. If a user deletes an email, it sits in the trash folder for 30 days. If they choose the “delete forever” option, it is gone immediately. There is no way to restore emails once they cycle out of the trash folder. Any restores for legal reasons must be accompanied by a court ordered subpoena.
- The support model for email/calendaring would be the most significant change. Currently all email/calendar problems are directed to the TCNJ Help Desk who handle 1st level troubleshooting and, if necessary, escalate the issue to the TCNJ NTS staff for further investigation. In an outsourced model, the campus users would still contact the TCNJ Help Desk first, but unresolved issues would need to be escalated to Google. A TCNJ liaison would need to be assigned to work with Google on email/calendar issues and track open support calls. If only a portion of the user population is outsourced (e.g. students and alumni), the Help Desk would need to be able to support multiple email solutions (e.g. Gmail and Zimbra) and escalate issues to the appropriate areas.
- Integration with the on-going Identity Management project needs to be considered. Gmail does have an interface to work with local authentication servers, but if we are providing “accounts for life,” it would that mean that TCNJ would now take on the burden of managing alumni accounts in our IDM project. The IDM project is currently being designed to handle current employees and active student population. A different architecture may be needed to handle the growing number of alumni that would be added each year. The other option is to not include email in the IDM project and issue separate

accounts and passwords for that function. Also, it will be imperative with either solution that perpetually unique usernames are assigned going forward to avoid any “username collisions” in the future.

- Other challenges to consider are smartphone (e.g. Treo) support. Currently, Gmail only appears to support smartphones via a stripped down browser interface. Calendar and contact support is questionable at this time.

Benefits

While there are challenges to overcome, outsourcing email/calendar does have its benefits. Some of these reasons are why other schools are moving in that direction.

- “Free” is always welcomed in higher education where budgets are tight. Using Gmail could save on annual student Zimbra license costs.
- The alumni and development office sees “email for life” as a way to keep in touch with students after graduation. It also benefits students nearing graduation and applying for job opportunities, since they would not to worry about their email account being removed during their job search.
- The support time currently spent by NTS staff resolving email/calendar issues could be redirect to other projects that more directly impact the academic areas. However, other resources would need to manage the relationship with the outsourced email/calendar vendor.

Conclusion

Outsourcing email at TCNJ has yet to take hold because of support and compliance challenges. This paper has outlined some lingering issues on what groups (students, alumni, faculty/staff) could have their email outsourced and if the level of support provided in an outsourced model would meet the expectations of those groups. TCNJ is currently investigating the outsourcing of alumni emails because accounts are currently not provided to them. They also appear to be the impacted the least by the challenges mentioned. Outsourcing existing student email accounts will depend on the resolution of the challenges listed in this paper. Faculty/staff email outsourcing is probably further away unless the cost-based outsource model is considered. If it is, the costs and benefits would need to be evaluated against their counterparts in a locally hosted solution.

Disaster Recovery/Business Continuity

A disaster recovery and business continuity plan specifies what should be done prior to a disaster to protect vital data and services in the event of an incident. It also specifies how to go about the recovery process once a disaster is declared, the system priorities and how long the recovery should take.

The **College currently maintains a DR plan** and is in the process of **building an alternate data center** in another location on-campus so that in the event a disaster strikes the primary data center in Green Hall, services can be quickly re-established in the alternate location. The

alternate data center will be a “**hot site,**” meaning that the servers will be actively running at all times. These servers will either be dedicated for recovery purposes or will be shared as test servers.

As part of the planning process, systems are being evaluated for their recovery needs and priorities. When new systems are added to the campus, the DR needs are evaluated and budgeted as part of the implementation. Currently the campus ERP system (Peoplesoft HR, Financials and Student) development servers are located in the alternate data center. These systems could easily be reconfigured to support product use in the event of a disaster to the primary systems. In addition, there is hardware available to be configured to support the library system and SOCS system if needed. There is also a standby Blackboard Transaction Server (BbTS) in the alternate data center that is utilizing Oracle Data Replication services to have an up-to-the-minute copy of the production BbTS database. The College is currently working on a disaster recovery plan for its email communications and expects to have a solution in place in the Spring of 2009. The College also has an offsite web server located at Mercer County Community College that will be configured and used for announcements if the College becomes inaccessible from the Internet. That server is expected to be ready for testing in Spring 2009.

It should be emphasized that a disaster recovery site is a site to restore business operations in the event that a disaster is declared. It is **not a general purpose fall-back site** if the primary data center is having temporary issues such as power, cooling or minor flooding. Some systems are not conducive to falling back to a primary site once they are transitioned to the alternate site. This should be taken into account when DR readiness tests are performed. **Some testing may need to be simulated** more than others.

The risk of not having a robust disaster recover/business continuity plan is great. The College needs to **review its DR plan annually** and update it as necessary. The College should also look into how to **protect its most valuable data assets if a localized disaster renders both the primary and alternate on-campus sites unusable.**

Every effort should be made to **protect vital data** on systems. This means that the College should continue to house identified **vital data at secure off-site locations.** In the future, NJEDge.NET plans to work with a storage vendor to provide secure, **vaulted storage** that its member institutions can subscribe to in order to provide a fast and easy way to **store data off-site such as HR, student and finance records as well as critical academic information (e.g. research documents, data, etc.).** This would allow the College to eventually recover from a large regional disaster that renders the entire campus unavailable.

However, having the **alternate data center should be considered a critical piece of the DR plan** since it is more likely that a localized incident would affect only the primary data center. The alternate site will allow the College to recover relatively quickly from a disaster event. In addition, having the alternate site on College owned property means that it can save on the expensive leasing fees charged to rent space at a co-location facility. **If the College needed to duplicate the alternate machine room in a co-location facility, it would likely cost \$318,000 per year in fees.** Finally, if NJEDge.NET does provide a cost effective storage vaulting option, the College would be wise to consider leasing some of this off-site storage.

Identity Management

Identity & Access Management (IAM) is currently a hot topic. **IAM is usually associated with IT because of its link to computing**, but **IAM is really an enterprise-wide process** requiring enterprise-wide involvement. The basic issue IAM tries to solve is identifying an individual through an authentication mechanism (e.g. login & password) and authorizing them to access and use certain services. For authorization, an identity is usually tied to a role or group that an application or service uses to determine if access is permitted or not. IAM can also go deeper into an application if the IAM software has specific support for the application. In those instances, access to specific portions of an application (e.g. different HR screens) can be managed via roles.

A comprehensive IAM plan should include non-IT related processes such as when an individual should be identified by the institution, how changes are handled and when an identity should be removed. **The technology is there to enhance and enforce the business process.** The business process is probably the most difficult and time consuming portion of an IAM solution.

The College currently has an ad-hoc Identity Management solution in place. Most applications are able to talk to one of the two College directories (Sun LDAP or Novell eDirectory) for authentication. In addition, a web front-end and batch scripts have been developed internally to manage account creation, modification and deletion. Changes to this system can incur significant staff time to modify the scripts and programs. **NTS is currently in the process of configuring a proof-of-concept IAM solution from Novell called the Novell Identity Manager.** This product is listed in the upper-right quadrant of Gartner's "Magic Quadrant" and has won additional awards. This solution will allow The College to present a single authentication (e.g. login/password) to 90% or more of our systems. It will also enhance our abilities to handle moves, adds and changes (MACs), as well as, self-service password resets.

IAM must be understood and seen as valuable by the executive staff to encourage its adoption by the rest of the campus. All areas that work with identities must be involved in mapping out the business processes that are currently in place as well as those that should be in place to handle the flow of an identity and related roles through its lifetime.

Many of the benefits of IAM are intangible. It simply makes good business sense and limits the College's liability. From an IT perspective, a well designed IAM process automates many of the changes that would require IT staff involvement. Accounts/identities can be created automatically and many role assignments can be based on existing data sources from the Peoplesoft ERP system. **Password resets can be automated** to free up the time the Help Desk spends on this task. Many **commercial IAM solutions also open up the ability to implement more secure authentication schemes** such as token-based or biometric-based identification which is consider more secure than passwords.

Open Standards

Open standards are publicly available specifications on how a particular implementation should be written to interoperate among similar implementations. Usually, open standards are free of any patent restriction (or at least offer a royalty free patent). Open standards are meant to

foster interoperability among applications. An example is the IMAP4 standard. This is an open standard that defines how an email client can talk to an email server to manipulate the emails stored on it. In contrast the Microsoft MAPI standard is a proprietary standard for manipulating emails from a MAPI-compliant email server (usually Microsoft Exchange). The MAPI standard is not available publicly. One must negotiate with Microsoft to get access to the specification. **Many open source applications implement open standards. This makes sense because open source software has no licensing fees.**

The College prefers to implement open standards where possible and practical in place of proprietary protocols to avoid vendor lock-in and enhance interoperability. This also affects the College's ability to negotiate on pricing and features. There may be additional costs to proprietary solutions when one needs to integrate them with 3rd party applications. The College may need to buy special software to translate between an open standard protocol and the vendor's proprietary protocol (e.g. between IMAP/SMTP and MAPI). One must also be wary of traditionally proprietary vendors that suddenly embrace open standards. There have been numerous cases where **vendors have performed "embrace and extinguish" tactics to kill a particular open standard** by carefully manipulating their implementation and using their market position to gain control of the standard.

The rewards of using open standard are great. The philosophy of open standards is to allow interoperability. For a consumer or end-user, that means that **one is free to choose the best products when assembling components to build a solution.** An example is an email and calendaring solution. By selecting components that support the IMAP4, POP3, SMTP and CalDAV standards, the College can evaluate, negotiate and select a solution from one or more vendors that fit the business needs of the College.

Network Core Infrastructure

The College currently maintains a large number of network switches (>300), as well as kilometers of underground copper and fiber optic cabling. Each of these resources has finite life spans and must be refreshed to maintain a properly operating network. Because of the costs involved, especially with refreshing outside plant and building cabling, **funding must be planned in advance.** By working with Campus Planning and Construction (CP&C), IT hopes to develop a plan to properly fund network technology refreshes in the future for network core equipment and interior and exterior cabling infrastructure.

Age is not the only factor for determining the useful life of the equipment and cabling. As network technologies evolve (e.g. faster speed, wireless), older equipment and cabling may no longer be able to support these emerging networking standards. For example, **some buildings currently have cabling that cannot support 100Mbps speeds.** Some network equipment does not support some of today's common network standards such as VLANs, quality of service and 802.1x network authentication. Some technologies such as wireless are quickly advancing and our current **core wireless switch is already reaching the end of its useable life.**

IT has put forth plans to upgrade the core network switches located in the primary data center to provide higher speed connections between campus buildings and to support newer Ethernet standards. This plan also includes upgrading edge equipment that is considered out-of-date and

no longer supported by the vendor. Funding was initially to be provided by a **state technology bond, but that bond has been delayed**. IT has worked with Budget and Finance to roll-out and **fund the upgrades over multiple years using College funds**. As previously mentioned, IT is working with CP&C to **determine the proper funding sources for network cabling installations and asset renewal**.

With a **modern and healthy network infrastructure, the campus network can be leveraged for future projects** such as network access control (NAC) and voice-over-ip (VoIP). By having equipment that can support modern network standards, the **College can take advantage of protocols that allow for better security and traffic control**.

Network Bandwidth Management

Bandwidth management is the process of permitting or restricting identifiable network protocols traversing the campus network to and from the Internet. Most of the focus of **bandwidth management is usually on the Internet connection** since that tends to be where bottlenecks occur. **The Internet bandwidth is finite and expensive compared to on-campus bandwidth**. The campus network typically supports **10Mbps or 100Mbps to the desktop** while the **network backbone is either 100Mbps or 1Gbps**. To date, this bandwidth has been ample and the only bandwidth management that has occurred is to block unwanted network traffic such as those created by on-campus viruses/spyware/malware and those that cause performance issues such as certain peer-to-peer (P2P) protocols.

Managing the traffic flowing between the campus network and the Internet has been a different story. Since the Internet connection is limited to only about 60Mbps, it could be consumed by a single desktop if not monitored and managed. **The College has implemented a “packet shaper” device**. This device can identify network traffic in a variety of ways, and rules can be configured to limit the bandwidth consumption based on the traffic content. For example, many P2P protocols can be identified and have been given a limited amount of bandwidth because they cause performance issues with the Internet connection. Another rule limits the total amount of bandwidth the residential network can consume. Finally, another example rule guarantees a minimum amount of bandwidth to the campus webserver so that off-campus visitors don't experience access delays.

Without a network bandwidth management strategy to provide direction on how to respond to bandwidth needs, the **College's Internet connection would be overrun** by only a handful of computers consuming all available bandwidth. College business operations that require the Internet would grind to a halt, and the College would be swamped with RIAA, MPAA and BSA DMCA complaints alleging that our students are sharing inappropriate content (i.e. copyrighted music, movies and software).

Through the NJEDge.NET consortium, **The College has the opportunity to use the Ruckus on-line music service for free**. IT has engaged Student Affairs to determine if contracting with Ruckus would provide a benefit to the students. Student Affairs, IT and some students met to discuss the pros and cons of Ruckus. **The students determined that Ruckus had too many limitations to guarantee its success at TCNJ**, so the project was set aside for now. Students can still sign up for Ruckus directly at no fee but The College would not maintain a local cache

server to speed up downloads. The **limited song catalog along with its lack of Apple iPod support** were major detractors according to the students.

While **IT can provide the technological means** for managing network bandwidth, groups such as **ITPC need to determine the procedures** that should be followed when setting bandwidth policies. This includes the types of network traffic that are considered necessary, those that can be limited and those that can be blocked. Guidelines on **how additional Internet bandwidth is acquired** will also help maintain the accountability for usage of this limited resource. The College also needs to **assist student groups that may be looking into legal music services** to make sure they know the technology limitations and to select a solution that will work on the existing campus network.

Virtualization

Virtualization is technology that allows one to “carve up” a physical resource such as a server into smaller, isolated resources. **The College has strongly embraced virtualization for servers, storage and networking.** Virtual servers, storage and networking save money, better utilize resources and ease disaster recovery efforts

Virtual local area networks, or VLANs, have been in use at the College for several years now and are considered a standard in all network switches. VLANs allow the networking staff to isolate traffic running on a single physical network into separate logical networks. Different policies can be applied to each VLAN. However, VLANs and all other virtualization technology suffer from a single-point-of-failure issue. The very feature of sharing and segregating a single physical resource can also be its biggest flaw. For example, if one VLAN on a network switch can adversely affect the switch itself (e.g. a virus is propagating on that VLAN), it may indirectly affect the traffic on the other VLANs that could be starved of that switch’s resources. **If one of the other VLANs was carrying for example, Voice-Over-IP, calls may get dropped or fail to connect.** Because of this, the College has also installed a parallel network that is more tightly managed to carry critical data traffic such as access control data (i.e. blackboard security data), building management (e.g. Honeywell) and NTS’ own management network for accessing the data network switches out-of-band.

Virtual networking is well established but one must take into account the resource utilization on a switch and the need to service network equipment as possible reasons to run parallel networks or invest in building a more robust (i.e. redundant network) that can handle scheduled or unscheduled outages. Some applications that are high bandwidth or disk intensive may have issues as a virtual server although the technology is constantly being enhanced to run these types of workloads.

NTS has been using EMC’s VMWare product for the past few years to achieve a handful of objectives.

1. VMWare abstracts the hardware differences from the physical machines making upgrading Microsoft Windows servers easier
2. Cost savings were quickly realized once it was proven that multiple servers could be supported on a single VMWare server with no perceived degradation in performance

3. The latest version of VMWare software provides many improvements in handling VMWare server failures and distributing “guest” virtual machine loads among available VMWare servers
4. Estimated savings in the first year of **consolidating multiple physical servers on to VMWare servers has saved the College an estimated \$72,000.00.**

NTS is also in the process of setting up **FalconStor’s IPStor product** to virtualize our storage. The IPStor product sits between the actual storage and the server and acts as a “storage broker.” The advantage of this is that we can mix and match storage products and setup tiers of storage based on the needs of the server and its applications. The IPStor will also mirror storage between two locations to **enhance disaster recovery as well as permit zero-downtime migration** from older, slower storage to newer, faster storage or storage that is more appropriate for its application. **Virtual storage is still in its infancy so one needs to be prepared to continually upgrade to keep pace.**

Significant saving can be realized if virtual servers are used where appropriate and properly configured to balance various workloads efficiently. Since virtual servers abstract the physical hardware from the virtual guest operating system, it makes server upgrades easier to manage. For the same reason, **it make the disaster recovery process easier** to realize since virtual guest operating systems can be easily restarted on another machine which need not match the production virtual server’s physical specifications. Virtual networks are usually an integral component of network access control (NAC) solutions. Virtual storage, like virtual servers, allows for smoother storage upgrades and disaster recovery options.

The Virtual Desktop

Server virtualization has become a common tool used in data centers to better utilize hardware resources. By utilizing a twist on the products that provide server virtualization, desktop virtualization can be achieved. VMWare has been a proponent of their **virtual desktop infrastructure (VDI)** in which a desktop OS, such as Windows XP, is run as a guest on their VMWare ESX server. Depending on the server size, **many copies of a desktop OS can be run.** Access is achieved through a remote access protocol such as Microsoft’s remote desktop protocol (RDP). A user would run an RDP client on their computer or thin terminal to access the copy running on the server. One might ask, why not just run the software being hosted on the VDI server on their existing desktop? The answer is that the **VDI server is better secured**; is located in an **environmentally controlled** room; and is **power backed up by a UPS and generator.** Remote access protocols also typically allow the client to disconnected and reconnect again later while the software continues to run on the server. This allows a faculty, staff or student to start an application while in a lab, disconnect and later reconnect from their office or dorm to continue their work.

Security is enhanced because all data that is saved while using the virtual desktop remains on the secure VDI server, **not on the user’s laptop which could be lost or stolen.** The College systems could be setup to **allow sensitive applications like HR to only be run from a virtual desktop** so that **no sensitive data is stored locally on the user’s physical desktop.** VDI could also be used to allow **students to access “virtual labs”** where there is software installed that cannot be easily installed or run on the student’s personal computer because of hardware

requirements or licensing issues. A student could simply run the RDP client on their personal computer to **access a pool of virtual desktops** setup to run a particular set of applications. Because of the way virtualization abstracts the real hardware from the virtual guests, it would allow for a unified desktop image and consistent desktop presentation. Finally, **mobile workers** could benefit from have a centralized, secured desktop that they can connect to and disconnect from as needed without worrying about having personal data that could be compromised on their laptops or home computers.

The College is currently in the research and development phase of reviewing this technology and will continue to research it over the next year with the hope of producing a proof-of-concept. The proof-of-concept would then be used to further refine/define the scope of a possible future project and to determine the viability of the technology at the College.

The benefits and limitations of using virtual desktops need to be understood to properly deploy them to solve a particular problem. **Virtual desktops are not appropriate for all situations.** Some applications do not run well in a virtual environment and sometimes licensing prohibits it. **One also needs to evaluate the hardware costs.** Sometimes it is cheaper to provide physical machines instead of purchasing beefed-up servers to handle the same number of virtual sessions.

A properly planned and deployed virtual desktop solution **can provide additional security for sensitive data, access for mobile users and virtual labs for students** that cannot get to a real lab and cannot (or do not) want to install specialized software on their computers. A time tested solution may also allow certain labs to switch from desktop computers to **thin client terminals** that may or may not be cheaper but would be easier to maintain and would **provide a greater ROI.**

Appendix

IT Strategic Plan

The goal for the IT strategic plan is to establish a process to tie the College's Strategic Aspirations, Enduring Goals and Key Performance Indicators to the local IT goals, strategies and plans.

Strategic aspirations:

1. Encourage, advocate for, and support the use of technology by academic, research, and administrative areas of the College to insure that technology is used to its full potential in the delivery of curriculum and business processes.
2. Optimize, protect and insure the College's computing resources with a robust and secure technology infrastructure.

Enduring Goals

1. Maintain and develop management information systems and tools to facilitate effective decision-making.
2. Using proven technology, extend teaching and learning opportunities outside the traditional academic classroom. Actively engage the academic community to build strategic plans and align IT with the needs of the academic units and the teacher scholar model.
3. Ensure a robust, reliable network including redundancy and disaster planning; protect the College's networks, servers, workstations, and data elements.
4. Manage financial resources to ensure appropriate levels of funding to support the College's strategic plans.
5. Identify, develop and support highly functioning data, voice, and web based communications infrastructure and applications to support internal and external stakeholders.

Enduring Goals and Related IT Strategies

- 1 Maintain and develop management information systems and tools to facilitate effective decision-making**
 - a) To make sound management decisions based on evidence, to limit redundancy, and to seek to improve efficiency while still providing excellent service, tools and support for the administration of The College. To provide seamless, state of the art tools in support of the administrative processes of The College.
 - b) To provide efficient and cost-effective management tools which enhance the institution's ability to conduct assessment projects and to plan effectively for the future.
 - c) Strategies:
 - i) We will be an "early follower" of new technologies positioning ourselves to take advantage of tested state-of-the-art software and products.
 - ii) A primary goal in designing systems will be to limit data redundancy

- (1) We will strive to implement systems so that no data will be entered more than once.
 - (2) There should be one primary data source for every piece of data.
 - (3) We intend to eliminate as many shadow systems as possible.
- iii) Identity Management
- (1) We will have a “One card strategy” and use the student/faculty/staff id card for financial transactions and for swipe access to buildings and parking lots.
 - (2) Our identity management strategy focuses on integrated user authentication and authorization with a primary source, propagating only a single unique identifier for each member of the community while maintaining data integrity
 - (3) We will develop our own “portal-like” front door to our systems creating a gateway which encourages integration among systems whenever possible
- iv) Software
- (1) We attempt to have single product solutions used campus wide where possible to save license costs and to insure quality data integrity.
 - (2) IT should be involved in all hardware and software purchases where possible.
 - (3) For application systems, we attempt to use vendor products before home grown.
 - (4) For network and system applications we will use open and community source where viable.
 - (5) We will adhere to TCNJ developed technical standards in system development methodology and web development approaches.
- v) Administrative Systems
- (1) We will support and maintain the existing vendor systems and provide new and enhanced delivered functionality based on prioritization and departmental needs.
 - (2) We will attempt to implement Oracle/Peoplesoft modules as vanilla as possible.
 - (3) We apply application patches/fixes singly for specific issues encountered and based on the vendor’s support cycle to ensure continuous support.
 - (4) We upgrade our systems in order to stay current with regulation and legislative update support.
 - (5) We will develop upgrade strategies to our ERP systems which are cost-effective and which meet user needs. We will utilize vendor lab services and targeted consulting services to perform our ERP system upgrades.
 - (6) We will identify and utilize service oriented architecture to provide integration between applications on disparate platforms while moving away from proprietary development.
 - (7) IT staff should function as analysts, collaborating with functional departments to streamline business process using technology.
 - (8) Bring all enterprise systems to a common architecture thus enabling seamless communication between systems.

- vi) Services and Research and Development
 - (1) IT will provide tools to enable end users to do their own reporting whenever possible.
 - (2) We will provide tools which encourage paperless transactions.
 - (3) We will use prioritization process in order to select projects for implementation based on campus wide priorities
 - (4) We will develop self service/web enabled systems whenever possible.
 - (5) We will stay current in Web 2.0 and evolving technologies, and determine how and when to add these tools and services to our suite of development tools.

2 Using proven technology, extend teaching and learning opportunities outside the traditional academic classroom. Actively engage the academic community to build strategic plans and align IT with the needs of the academic units and the teacher scholar model.

- a) To provide and support exceptional IT infrastructure, tools and services that facilitates effective use of technology by faculty and students in support of teaching, learning and research.
- b) To support the College's mission to develop a *“diverse community of learners, dedicated to free inquiry and open exchange, to excellence in teaching, creativity, scholarship, and citizenship, and to the transformative power of education in a highly competitive institution.”*
- c) Strategies:
 - i) To remain current with technological advances in order to adopt technology that is to the best long term advantage of The College community, within budget constraints.
 - ii) Our strategy is to implement wireless technology in community spaces around campus, as opposed to individual classrooms. Refer to <http://www.tcnj.edu/~nts/wireless/> for TCNJ's accepted wireless plan.
 - iii) Use the Dean/IT committee to analyze needs annually and to identify IT and Facilities funding possibilities and timelines.
 - iv) Work with the Dean's Council, the academic computing advisor, departmental liaisons and ITPC to look for and create opportunities for the campus community to articulate the need for new products, support, and services.
 - v) Service and Support Strategy
 - To provide the highest quality support for the academic enterprise that both targets TCNJ's needs and balances those needs with available resources
 - (1) Provide, within staffing and budget constraints, equipment, access and resources to support academic research and the recruitment of academic faculty.
 - (2) Collaborate with academic area on pilot technology programs.
 - (3) Collaborate with departmental liaisons and the designated academic technology analyst to improve services and support of research and the academic enterprise.

- (4) Provide timely user support to the academic areas in terms of responding to service calls, collaboration on software choice and training, with special attention to resolving issues which affect class session.
- (5) We utilize a home grown course management system (SOCS), rather than a vendor product due to its current functionality, flexibility and popularity with our faculty.
- (6) Assist faculty members in the development of curriculum and making sound pedagogical choices influenced by IT.
- (7) Provide advanced instructional technology equipment.

3 Ensure a robust, reliable network including redundancy and disaster planning; protect the College's networks, servers, workstations, and data elements.

- a) To continually assess and improve the technology, practices and capacity employed to secure and deliver data over The College's networks, servers, and individual workstations.
- b) To provide a robust, secure and reliable network. This includes the security of our campus network, servers, and data.
- c) Strategies:
 - i) Collaboration and Cooperation
 - (1) Collaborate with campus stakeholders to determine network needs.
 - (2) Cooperate with NJEDge.NET to acquire external bandwidth at consortium pricing.
 - ii) Network Capacity Planning
 - (1) Maintain a state-of-the-art campus network infrastructure to meet the needs of the campus community and support emerging network technologies/standards.
 - (2) Take advantage of campus construction projects to refresh the physical network plant and install additional pathways for network redundancy.
 - (3) Leverage available devices and technologies to control, secure and manage the traffic and bandwidth on the campus network.
 - (4) Maintain aggressive cycle of upgrades for core and edge communications equipment to ensure timely support and reduced downtime.
 - iii) Identity and access management
 - (1) Centralize user identity storage and management in order to better control user access.
 - (2) Limit user access to those systems and services required for their job function.
 - (3) Use current campus identity and access management products to limit access to the campus network to authorized parties.
 - iv) To educate the campus community members on their individual responsibility to insure security of institutional computing resources.
 - (1) To proactively provide education and communication regarding national issues in information security – such as illegal music downloading and appropriate use of computing resources.

- (2) To be attentive to concerns which might put the campus at risk in the area of information security.
- (3) To conduct periodic internal audits to review the success of our security measures.

4 Manage financial resources to ensure appropriate levels of funding to support the College's strategic plans.

- a) To secure and effectively manage the financial resources necessary to enact the Information Technology guiding principles.
- b) Overall Planning Strategy:
 - i) Align IT Strategy with College Institutional Planning
 - ii) Conduct yearly updates of IT White Papers; share with Cabinet and ITPC.
 - iii) Incorporate project management concepts into IT projects where possible, including the use of MS Project as planning tool for yearly IT projects.
- c) Budgetary Planning
 - i) Maintain a centralized budget, purchasing and support model.
 - ii) Maintain a 4 year replacement cycle for desktop equipment.
 - iii) Maintain multi-year replacement cycle plan for network and server equipment.
 - iv) Maintain multi-year budget plans including building IT reserves for maintenance and replacement of network equipment, servers, media equipment in classrooms.
- d) Staff Development Strategies
 - (1) Support the ongoing training and development of IT staff by encouraging staff to attend and present at professional conferences, identifying and encouraging staff to attend appropriate training, and using a committee to identify and provide cost effective methods of staff development within the division.
 - (2) Attend to the issues of recruitment and retention and professional development of IT staff.
- e) IT Awareness Strategy

Raising campus awareness of choices, concepts, resources, standards, procedures in order to leverage existing processes, improve service and minimize redundancy

 - i) The Vice President for Information Technology should serve on the President's Cabinet.
 - ii) The Information Technology Planning Council (ITPC), a college wide governance council, is a source of input and feedback.
 - iii) Encourage staff to participate in professional organizations, make presentations at conferences and share experiences and expertise with the higher education community in formal and informal settings.
 - iv) Customer Service Strategy:

Provide quality customer service that is timely, responsive, and flexible.

 - (1) Operate in a transparent, accountable and flexible manner by providing opportunities for feedback and participation in important information technology decisions.

- (2) Look for and create opportunities for the campus community to articulate the need for new products, support, and services.

5 Identify, develop and support highly functioning data, voice, and web based communications infrastructure and applications to support internal and external stakeholders.

- a) To provide state of the art technology to enable and support electronic communication and to leverage electronic communication to enhance interactions with external constituents and expand The College's pool of stakeholders, advocates and supporters.
- b) To develop and review short and long term technology and business strategies for voice and data communications on campus.
 - i) To stay current in our knowledge of vendor offerings, costs and technology options.
 - ii) To encourage the campus leadership to review and re-assess our communication assumptions and service offerings.
- c) Strategies:
 - i) Collaboration and Cooperation
 - (1) Suggest and evaluate technological solutions to address stakeholders' challenges providing information to their target audience.
 - (2) Develop and maintain working relationships with stakeholders to assess their communications needs.
 - (3) Stay aware of the level of usage of new products by our faculty, staff and student body and adjust our offerings to address their expectations.
 - (4) Provide economical and efficient solutions to stakeholders' communications needs by leveraging existing technologies or implementing new technologies as required. Develop long range technology and business plans for how to upgrade our communications infrastructure.
 - ii) Technology Approaches
 - (1) Use current products to provide and maintain quality service on traditional communications avenues.
 - (2) Leverage new technologies that have a proven track record to meet the communications needs of new facilities on campus.
 - (3) Use existing and new technologies to provide solutions that efficiently and economically extend communications infrastructure to internal College facilities as well as outside the main campus.
 - (4) Determine the appropriate level of "convergence" for data and voice technologies.
 - (5) Provide a limited set of campus resources available directly from the Internet and require VPN authentication/access for other on-campus resources.

wireless

@ TCNJ

Wireless Schedule

Schedule and locations subject to change. Timeframes are estimated and are based on the expected difficulty in getting data cables installed to access-point locations. Projects with multiple objectives (i.e. locations) may come on-line as the project progresses.

Areas surrounding the locations below may also have wireless coverage.

Additional areas will continually be added as time and funding permits.

Building	Status	Additional Notes
Science Complex	Approved	Chemistry-Biology bridge - coming spring semester '09
Holman Hall	Approved	Computer Science department - coming spring semester '09
Armstrong Hall	Approved	TBD labs - coming spring semester '09
Green Hall	Approved	2 - 3 TBD locatiion - coming spring semester '09
Holman Hall	Done	Rooms 372, 374 A&B, 439 and CS Lounge
Science Complex	Done	Chemistry Rooms C-216 and C-217
Brower Student Center	Done	Rooms 202, Main Lounge, Smaller Lounges
Social Science	Done	Atrium
New Library	Done	Entire building
Rec. Center	Done	Open areas used for events
Science Complex	Done	Lounges in Chemistry (2nd flr - Link), Biology (1st & 3rd flrs) and Physics (East end)
School of Business Building	Done	Basement Student Lounge
Bliss Hall	Done	Lounge
Kendall Hall	Done	Blackbox Lounge
Loser Hall	Done	Admissions, Nursing Clinical Lab and Trustees Board Rm.
Armstrong Hall	Done	Lounge by Snack Cart
Eickhoff Hall	Done	Lounges and Main Dining Area
New Residence Hall	Done	"Pocket" lounges
Packer Hall	Done	Lounge
Holman Hall	Done	Rooms 407 A & B
Music Building	Done	Basement Lounge
Forcina Hall	Done	Entire building. Replacing existiting legacy wireless equip.

Information Technology Project Plans 2007-2008

ID	Task Name	Finish	% Complete	Notes
1	EA Projects	Thu 3/26/09	95%	
9	Eadvising - develop technical plan-phase 1	Wed 6/27/07	100%	
10	Eadvising- implement technical plan - Phase II	Thu 3/26/09	0%	transfer to fy09
5	Housing	Mon 6/30/08	100%	
20	Fin Upgrade	Mon 7/2/07	50%	RFPs submitted by the vendors - transfer to fy09
3	Apply TOSes for FA winter regs	Mon 3/10/08	100%	
7	TOSes	Mon 6/30/08	100%	ongoing
19	Financial maintenance to web projects	Mon 6/30/08	100%	ongoing
12	Enhancing Security - Net ID (formerly ID Management)	Wed 4/30/08	90%	transfer to fy09
17	Staff professional development plan	Mon 6/30/08	100%	on-going
13	Workflow	Thu 5/15/08	100%	
14	Develop a plan with NTS for the retirement of the mainframe	Mon 6/30/08	100%	
8	Eadvising	Wed 10/31/07	100%	
11	Eliminate the use of the ssn as an identifier for 3rd party systems	Thu 2/28/08	100%	
16	Implement SOA technology	Mon 6/30/08	100%	
15	Implement web2 technology	Mon 6/30/08	100%	
4	research "Shared Services" which colleges are running ERP systems as a shared product	Fri 12/14/07	100%	
6	HR maintenance packs	Thu 12/20/07	100%	on-going
2	HR patches & fixes	Mon 6/30/08	100%	ongoing
18	SA Security	Mon 6/30/08	100%	ongoing
21				
22	Networking and Technical Services	Mon 1/4/10	57%	
23	Arts Building IT Cabling & Specifications	Mon 8/31/09	25%	transfer to fy09
24	Decker Building Renovation IT Cabling	Mon 8/31/09	25%	transfer to fy09
25	DR Room IT Cabling	Wed 10/31/07	100%	
26	Forcina 103 Lab upgrade	Thu 1/31/08	100%	
27	FY08 MTSS Upgrades	Thu 1/31/08	100%	
28	Green Hall Electrical Upgrade	Tue 9/1/09	15%	Project driven by Facilities-transfer to fy09
78	IT construction specifications	Fri 2/27/09	18%	
83	construction drawing phase	Fri 2/6/09	0%	transfer to fy09
82	design development phase	Fri 1/16/09	34%	transfer to fy09
79	programming phase	Fri 2/27/09	0%	Update to correspond with Edu blging dates-transfer to fy09
80	RFP phase	Fri 2/27/09	2%	Update to correspond with Edu blging dates-transfer to fy09
81	Schematic phase	Fri 2/27/09	56%	Update to correspond with Edu blging dates-transfer to fy09
29	Student Apartments IT Cabling & Specifications	Mon 8/31/09	30%	transfer to fy09
30	Emergency Notification System RFP	Fri 9/28/07	100%	
31	Forcina telephone cabling project	Fri 6/20/08	100%	
32	Long-term voice communications planning	Mon 1/4/10	15%	Finish date per telecomm presentation-transfer to fy09
33	Major network upgrades-Year 1	Fri 8/22/08	100%	
34	CR/DR Access Control	Tue 7/1/08	100%	Waiting on Facilities-transfer to fy09
35	Novell ZENWorks 10 Upgrade	Wed 1/14/09	95%	transfer to fy09
36	Software Delivery Research	Wed 9/30/09	40%	transfer to fy09
37	BlackBoard - Credit Card Functionality	Fri 12/28/07	100%	
38	Equitrac V4 Upgrade	Mon 7/14/08	100%	
39	BlackBoard - Serial Number Conversion (original)	Fri 5/30/08	100%	
40	MS SQL server primary and DR	Fri 6/20/08	100%	
41	Alternative to Peoplesoft Support	Tue 12/30/08	90%	transfer to fy09
42	EA TOS Support	Fri 6/27/08	100%	
43	Mainframe DR Testing	Wed 4/30/08	100%	
44	Mainframe Retirement	Fri 10/30/09	55%	transfer to fy09

Information Technology Project Plans 2007-2008

ID	Task Name	Finish	% Complete	Notes
45	Operator Training	Fri 12/5/08	53%	transfer to fy09
46	Raiser's Edge DR	Thu 10/1/09	10%	Need DR room server first-transfer to fy09
47	SA Go Live Support	Fri 3/13/09	40%	transfer to fy09
48	SA/HR/FIN move to DR	Mon 12/1/08	25%	transfer to fy09
49	Scan alternatives	Fri 10/31/08	50%	transfer to fy09
50	Mainframe Upgrades/Monitoring/Maint	Fri 6/27/08	100%	
51	Operator documentation	Thu 11/29/07	100%	
52	BI reporting tool Support	Tue 12/30/08	90%	transfer to fy09
53	Data Base Monitoring Application	Tue 12/30/08	15%	transfer to fy09
54	Financials Upgrade to 9.0	Mon 6/1/09	15%	transfer to fy09
55	HR DR Testing	Mon 12/17/07	100%	
56	Move All off of Elbonia	Mon 11/3/08	60%	New server needs to be re-installed with Solaris 9-transfer to fy09
57	Netscaler Upgrade/config/test	Fri 6/27/08	100%	
58	Planning for load balancing and failover on ps apps	Mon 12/1/08	60%	transfer to fy09
59	Upgrade Oracle 9i to 10g on secondary applications	Fri 6/27/08	100%	
60	Webpartner config/test	Thu 1/1/09	60%	on-hold due to SA delay
61	Identity management proof-of-concept	Fri 12/19/08	70%	transfer to fy09
62	Server replacements (TCNJ61/23/24/35/59/14)	Fri 6/20/08	100%	
63	VDI Research	Fri 8/28/09	10%	transfer to fy09
64	Academic wireless initiative-Phase I	Fri 8/31/07	100%	
65	Academic wireless initiative-Phase II	Fri 10/12/07	100%	
66	Configure DR room servers/network	Fri 12/19/08	70%	transfer to fy09
84	Document backup procedures	Fri 12/19/08	7%	transfer to fy09
67	Email/Calendar Upgrade (Zimbra)	Mon 10/1/07	100%	
68	Hire Manager of IT Security	Fri 6/20/08	100%	
69	Switch Unix/Linux printing to CUPS	Fri 6/20/08	100%	
70	Web/DNS server at MCCC	Fri 1/16/09	80%	transfer to fy09
71	Zimbra email/calendaring upgrade	Mon 10/1/07	100%	
76	BMC SQLBT Upgrade/Install	Thu 10/30/08	100%	
72	Create ps documentation (internal)	Tue 7/1/08	100%	
73	Financials DR Testing	Mon 12/17/07	100%	
74	Magic Upgrade support	Tue 10/30/07	100%	
75	Raiser's Edge Upgrades	Fri 6/27/08	100%	
77	Telecomm SIS billing	Fri 9/14/07	100%	
85				
86				
87	User Support Services	Tue 6/30/09	60%	
120	Chat Module for Admissions	Mon 12/1/08	30%	transfer to fy09
116	Develop centralized desktop environment	Mon 6/30/08	0%	transfer to fy09
115	HP to Canon conversion in labs	Mon 6/30/08	5%	transfer to fy09
97	Lab Screen Saver	Sun 6/1/08	100%	
94	OS X Leopard Testing and rollout	Fri 1/16/09	25%	transfer to fy09
99	SOCS upgrades and new features	Mon 6/30/08	100%	
100	Explore expansion of SOCS server to transition from CD arc	Mon 6/30/08	100%	
101	Implement Wiki functionality in SOCS	Wed 5/14/08	100%	
88	Web initiatives	Fri 1/16/09	75%	
89	Account.tcnj.edu - ID Management	Fri 8/1/08	100%	Still needs to be implemented-transfer to fy09
90	Facilities Management Budget System	Thu 11/1/07	100%	
92	ERSPA - Rewrite	Fri 1/16/09	29%	transfer to fy09
91	SOCS Administrative Modules	Fri 8/1/08	100%	
93	Faculty Profile System	Wed 10/1/08	80%	transfer to fy09
119	Portal	Mon 2/2/09	49%	transfer to fy09

Information Technology
Project Plans
2007-2008

ID	Task Name	Finish	% Complete	Notes
96	Wake on LAN for computer labs	Mon 9/1/08	71%	HOLD until ID Management project is complete-transfer to fy09
98	Inventory data gathering transition	Mon 9/1/08	0%	transfer to fy09
102	Third party application support transition	Tue 6/30/09	77%	
105	Campus Call	Fri 12/14/07	100%	
108	EPO	Fri 12/14/07	100%	
114	ID Works	Fri 12/14/07	100%	
107	Kofax / Ascent - imaging	Fri 12/14/07	100%	
106	Magic	Fri 12/14/07	100%	
113	PowePark	Fri 12/14/07	100%	
104	Primivera	Fri 12/14/07	100%	
109	R25	Tue 6/30/09	0%	transfer to fy09
111	R25 Invoicing	Tue 6/30/09	0%	transfer to fy09
110	Research R25 Web Services	Tue 6/30/09	0%	transfer to fy09
103	Raisers Edge	Fri 12/14/07	100%	
112	Titanium Implementation	Fri 8/1/08	0%	transfer to fy09
118	Video promoting faculty initiatives	Thu 5/1/08	100%	
95	Imaging IT business office	Mon 6/1/09	1%	CANCELED
117	Content Manager (Conversions & expand useage. Possible replacement)	Tue 6/30/09	0%	transfer to fy09

The College of New Jersey Information Technology

To: Nadine Stern, VP for Information Technology & Enrollment Support Services

Purpose: End-of-Year Status Report

Submitted: Lynn Braender, Academic Computing Advisor

Introduction

The position of Academic Computer Advisor was first introduced in the Fall of 2005 by the Vice President of Information Technology and Enrollment Support Services (IT/ESS), Nadine Stern. Her vision was to create a partnership between Information Technology and the academic units it supports by enhancing communication and the flow of ideas between these two groups. To meet this vision, the Academic Computing Advisor meets regularly with faculty, leaders in the academic community, and IT staff to discuss issues relating to academic computing.

Initially, Dr. Tom Hagedorn from Mathematics and Statistics held this position followed by Dr. Felicia Steele from English. Each Academic Computing Advisor holds the position for a two-year period with reassigned time of one course per academic year. I accepted this position at the beginning of the 2007-2008 academic year; my term will end at the end of spring 2009.

This end-of-year report will identify my activities to date as Academic Computing Advisor and the emerging issues, I believe, that are confronting TCNJ.

2007-2008 Activities

The majority of my time spent in this role has been dedicated to identifying some challenges and opportunities in the academic community with regards to technology. This has led to many conversations with deans and their supporting staff, individual faculty, departments, standing committees, ad hoc committees and councils. I have also hosted webcasts and workshops and learned much from professional conferences (e.g., Educause, NJEdge, and NMC). The following is a discussion of this work.

- Academic Leaders - To ensure the effective relationship and open communication between IT and the academic community, the Academic Computing Advisor is expected to regularly attend monthly meetings with Jeff Kerswill, Director of User Support Services, and one dean (we meet with deans on a rotating schedule). One meeting is scheduled per month and may include supporting staff from the respective school. In

each meeting, we discuss current and future IT needs. I've also attended the Dean's Council meetings with Nadine Stern and Jeff Kerswill to discuss high-level IT issues.

- IT Leaders - I've met regularly with Nadine Stern, VP for IT & Enrollment Support Services (IT/ESS), and Pat Pasinski, Executive Assistant to the VP (IT/ESS). During this time, we update one another on the conversations we've had with members of the TCNJ community and the issues facing the college. I have also met with key IT staff, including Jeff Kerswill, Director of User Support Services (USS), Craig Kapp, Assistant Director of (USS), and Shawn Sivy, Dir of Network & Technical Services, to discuss issues relating to IT and the academic community.
- Faculty - As the Academic Computing Advisor, I've met with the faculty from the Nursing department, the Music department, and the assessment team from the School of Business. In addition, I've met with a team of faculty, management, staff, and administration about the possibilities of applying for external grants.
- ITPC - As the Academic Computing Advisor, I have attended bi-weekly Information Technology Planning Council meetings. This interdisciplinary council, with members from IT, SGA, academia and administration, discuss issues facing this college and provides recommendations to the VP of IT & ESS on these issues. I have also led a subcommittee for this council that examined academic computing resources at TCNJ and how they compare to other peer and aspirant schools. The goal for this task force was to investigate the competitive nature of IT usage within the college and report its findings back to this council.
- Teaching/Learning Task Force - As the Academic Computing Advisor, I was a member of the Teaching/Learning Initiative taskforce established in the 2007-2008 academic year by Beth Paul, Interim Provost. The task force was charged with exploring the need for a Teaching and Learning center. My responsibility was to identify the role academic computing would play in this center.
- Faculty Data Systems Committee - As a result of the conversations Jeff Kerswill and I had with many academic leaders, it became clear that many of the academic units were struggling with the assessment and reporting needs of accreditation. The information requirements for accreditation were enormous and the academic units were barely keeping their heads above water. To support these efforts, Nadine Stern formed the Faculty Data Systems Committee to investigate the needs of the various academic units and to identify a unified model for meeting accreditation reporting requirements. Representation from all areas needing faculty data was included in this committee. As the Academic Computing Advisor, I am a member of this ad hoc committee led by Paula Maas, Acting Executive Director of Institutional Research and Craig Kapp, Assistant Director of User Support Services (USS).

- Conferences - In addition to speaking with key members of the campus community, I have also attended the NJEDge Fall conference, NJEDge Faculty Showcase, the 2008 New Media Consortium Summer Conference, and have coordinated and attended the webcast on "Education in Exponential Times: How Technology-Enabled Change is Reshaping Higher Education"
- Workshops - With the financial support from Nadine Stern and Beth Paul, and assistance from Craig Kapp, I have developed two Lunch'n Learn workshops for the Spring 2008 semester. These workshops provided introductory knowledge to faculty on using technology to enhance communication with students and designing courses to use technology to support team work. Both workshops were well attended and feedback was positive.

Emerging Issues

Internet2: Music

Nadine Stern and her staff developed an Internet2 pipeline to the campus and have searched for opportunities for faculty to use it. Because of the lack of use of this pipeline and the need for greater bandwidth for Resnet and Administrative systems, some Internet2 bandwidth was reallocated to these systems. In response, however, to a statement made by Nadine Stern about the value of Internet2, faculty and staff members from the music department came forth with a proposal about streaming in five live performances from the Philadelphia Orchestra. Initially, the music faculty and staff suggested that the performances should occur in the Mayo music building, but, after further analysis, this would not be optimal solution. The acoustics in Kendall Hall are far superior for an orchestra and, because of the changes needed to the communication systems of either building in order for these performances to take place, it would be wiser to make these changes to Kendall Hall.

Conversations between Teresa Marrin Nakra, Richard Kroth, and me have occurred on this proposal. Subsequent conversations about the technical requirements and possibilities ensued with Taras Pavlovsky, Dean Library/Interim Dean A & C, Shawn Sivy, Andrew Brunetto, User Support Services Manager, Richard Rose, Computer Graphics Technician, Jon Bannan, Professional Services Specialist from USS, and Brad Coburn, Assoc Dir of Communication Technologies. There are many technical challenges with bringing in this concert series to The College of New Jersey. We can overcome some of these challenges but it is still questionable whether or not we would be able to obtain enough bandwidth from our Internet2 connection with NJEDge, TCNJ's Internet2 provider. Conversations with NJEDge have occurred and possibilities will continue to be explored.

Action

Shawn Sivy and I will continue exploring technical solutions with NJEDge. There may be a slight possibility that NJEDge will be capable of providing a short burst of Internet2 bandwidth to the college for these performances. To support this, we may need to investigate possible

funding sources (e.g., NSF) to pay for larger bandwidth. Music faculty, to date, are not interested in pursuing funding opportunities. To be successful, we may need to look to others areas on campus for help (e.g., Grants, Public Affairs). In addition, we will need Administration to allow us to temporarily redirect some Internet bandwidth from Resnet and other systems for these performances. Performances usually occur Friday afternoons and Thursday evenings.

A solution will not appear quickly, if at all, on this endeavor. But, if it does, TCNJ will be one of the first colleges to host an internationally acclaimed orchestra with cutting-edge technology. The benefits of such an event could be enormous and bring great publicity to the college.

Internet2: Sports

There is an affiliate to the Sarnoff Corporation located in West Windsor, NJ that is currently developing a system that would record sports events for Division 3 colleges and broadcast these events over Internet2. These smart recording systems are self directed and need minimal human support. If installed at TCNJ, they would allow alumni, family and friends to watch our students compete at home games. I contacted Jon Bannan, Professional Services Specialist from USS, about the possibilities for this broadcasting system; Jon contacted faculty in the appropriate academic units. Unfortunately, he could not rouse any interest.

Action

The college will eventually need to broadcast its sports events over the Internet. At some point it will be expected of us. Regardless of this, the goodwill created by broadcasted sports events is great. The college should explore this technology and find a champion to support it. This champion should be someone from athletics.

Colleagues Committed to Redesign (C²R)

Beth Paul requested that I coordinate efforts for the college to apply for the C²R grant from The National Center for Academic Transformation. To accomplish this goal, we need to first identify one multi-sectional course that could be transformed to incorporate the teaching models created by NCAT. These models bring technology into the classroom and the learning environment. Discussions have begun with interested faculty including Bob Anderson, Assistant Provost of Liberal Learning, Rosa Zagari-Marinzoli, Assistant Dean from the School of Culture & Society, Craig Kapp, and Taras Pavlovsky, Dean of the Library and Interim Dean of School of the Arts & Communication. Jeff Osborne, Dean of the School of Science, faculty from the math department, and Susan Albertine, Dean of the School of Culture & Society, have also stated an interest in this grant.

Action

Because of the change in college leadership, efforts on this project have been suspended. I have been advised to wait on this project until the new provost determines whether or not the

college will provide the commitment (e.g., financial and academic resources) needed to secure this grant.

Faculty Technical Knowledge

During my conversations with Deans, Assistant Deans, and campus leaders, I discovered that there is a perception that faculty knowledge of current and emerging technological tools, applications, and issues in their area is stagnant. This perception was also discussed in the conferences that I attended. Many TCNJ leaders see the technological and cultural gap between faculty and students growing. With dwindling resources and increasing demands on faculty time, we need to develop effective strategies to enhance faculty academic computing knowledge.

Action

With dwindling resources and increasing demands on faculty time, TCNJ leaders are attempting to develop effective strategies to enhance the academic computing knowledge of faculty. Academic leaders have agreed that any approach must be multifaceted. Some suggestions are listed below.

- ✓ Early Adopters of Technology - Identify, encourage, and support early adopters of technology. Ensure that early adopters have knowledge of local and online resources that support continuing education. Examples of this type of resource could be the conferences and focus groups supported by NJEDdge and webcasts provided by Educause and the Society for College and University Planning. Have these early adopters speak to our college community about their experiences through campus workshops.
- ✓ Focus Groups – These groups may be a means of supporting interdisciplinary conversations, providing a learning mechanism to faculty, and spurring innovative academic uses of emerging technologies (e.g. Wiki builders, Internet2, etc.).
- ✓ Guest Speakers – Schools, programs, and groups need to bring in speakers from outside the college to discuss specific technological issues (as compared to global or high level topics) that affect them directly. The school has enjoyed success with internal presentations and workshops; we need to complement this activity with leaders from peer and aspirant schools, and, from industry. We should also take advantage of local information technology conferences such as NJEDdge and webcasts.
- ✓ Workshops - During the 2008-2009 academic year, I hope to run a series of Lunch'n Learn workshops including workshops that are basic and others that are more advanced. I will also search for new educational opportunities from web conferences, campus affiliation with professional organizations such as Educause and NJEDdge.

- ✓ Podcasts, webcasts, and web conferences are also emerging as an effective learning environment that allows people to attend workshops from their home or office. The college could rely more on these to reduce travelling costs and increase the knowledge of its community. Whenever possible, I will also identify and promote podcasts and webcasts through the faculty discussion list.

Ethics and Security

Technology creates new ethical challenges that require our community to act responsibly, professionally, and intelligently. We need to build a culture that requires the academic community to prepare students to live and work in a techno-community and to behave in ways that support TCNJ's vision. To address this issue, I applied for and received an IT mini-grant that will build an online learning environment for TCNJ students. To date, a student worker has been hired to assist with the design and development process. In addition, experts in the IT field helped to identify the best environment to support the educational goals of this project. The beta version will be employed in the School of Business during the Fall 2008 semester in its Freshman Seminar classes and its Introduction to Information Systems classes.

Action

We hope to learn from this website and make enhancements or revisions based upon lessons learned. We will also require students to take a pre and post test so that the effectiveness of the learning environment can be measured. If proven successful, we can look for other areas at TCNJ to employ this site.

Assessment

There is an increasing demand being placed on schools to assess the quality of their programs and processes. Currently, there is no shared effort to identify assessment requirements or solutions across all schools at TCNJ. For example, the School of Education has successfully employed SOCS to manage and run this process. Unfortunately, it has reached a point where their IT requirements surpass the capabilities of SOCS. Conversely, the School of Engineering has developed their own database system to maintain their assessment data. And now, the School of Business is in the process of purchasing a system that could assist them. If each school continues down this course, and others follow, the college will be unable to centralize assessment information. The development of future systems designed to consolidate this information will be difficult and costly.

Action

It is critical that the college set a strategy to integrate all assessment activity into one system. To address this, conversations with key individuals are occurring. Nadine Stern, along with her staff, Deans, and, administrators have met and will continue to discuss issues relating to this crucial area. In addition, the following activities are occurring:

- ✓ Nadine Stern has developed an inclusive task force, known as the Faculty Data Systems Committee, to identify data requirements. This taskforce, led by Paula Maas and Craig Kapp, have met twice and is currently identifying requirements and possible technical solutions.
- ✓ Jeff Kerswill is planning a Dean's Council Meeting to educate them on the assessment capabilities currently available in SOCS
- ✓ Craig Kapp and Paula Maas have extended an invitation to all assessment committees on campus to demonstrate SOCS' capabilities and to discover user needs not currently supported by SOCS. They have met with the School of Business and are actively working with the School of Education.
- ✓ Craig Kapp and I spoke about SOCS assessment capabilities at the second Lunch'n Learn presentation and the Spring ITS workshop. Future workshops can be planned.

Funding and Resources

To stay competitive, the college, schools, and programs will need more money to fund their future information technology needs. The budget for IT has been reduced in recent years and it appears it will continue to operate with a minimalistic approach. The college needs to identify creative ways to fund individual, interdisciplinary, and school projects. To date, the IT department is funding mini-grants; this process has earned favorable feedback from faculty, administration and external constituents. In addition, many of these mini-grants are involving students in research, thereby supporting the college's goal to provide students with research opportunities. If the college wishes to spur innovation in academic computing and raise the technological skill, knowledge, and usage of its community, it needs to continue funding these mini-grants. With greater demands for resources by the school, funds from this pool may be at risk of being absorbed back into general funds. This must not happen.

Schools will also need to fund special projects involving technology. Some may be small; for instance, a laptop with docking capabilities for a new faculty and technologically skilled faculty. Some may be large; for instance, creating or renovating a lab to support an innovative program or purchasing GPS systems for students travelling into unsafe communities for projects, journalistic endeavors, and service. The college needs to create alumni and industry donation opportunities to fund special projects.

Some of our academic units do not have the technical resources and computer labs needed to provide a technically-savvy learning program. Because of this, they often need to schedule classes and learning activities outside their building. Nursing is a good example of this. Because the computer labs are in other buildings, the school housing the lab has a sense of ownership for that lab. Nursing is often bumped out of the lab at the beginning of a semester; they then need to scramble to find other accommodations. When reserving a lab outside of their building, nursing faculty often discovers someone else using the room. This is not an IT

problem but a scheduling and academic one. Administration needs to assure academic units like Nursing that they have priority over some lab on specific days of the week. The college should also consider creating a secure testing lab to reduce our reliance on paper and provide courses and programs with the ability to provide online testing.

Action

The level of discussion needed to address this funding and resource issues lies with administration. Nadine Stern and Pat Pasinski have been recently made aware of the computer lab problem and have initiated conversations with the appropriate academic leaders.

SOCS – Simple Online Courseware System

SOCS, the college's course management system, has proven to be enormously successful. Craig Kapp, with the assistance of John Kuiphoff, Instructional Technology Coordinator/Web Developer, has created a course management system that enhances the learning environment at TCNJ. They've successfully incorporated new technology into SOCS and have significantly influenced the use of technology in our academic environment. The college's success with SOCS can be seen by the enormous strains placed on this system. To maintain this success, the college needs to continue funding and expanding SOCS or move to a commercial system that provides advanced capabilities.

Action

As conversations continue on campus about assessment, new requirements for SOCS will be identified.

Document Management and E-Collaboration

Schools, programs, and committees need to be able to manage formal documents. Collaboration across these groups is extremely important and can only be effectively facilitated by an online document management system. In addition, we need to set up a shared environment that allows faculty and students to identify others working in related research areas or areas of interest. We need to capitalize on emerging Internet technology to create a virtual environment that enhances the efficiencies of research, teaching and learning.

Action

I will ask Jeff Kerswill to place this discussion item on the Deans' Council agenda. I will also ask Pat Pasinski to place this discussion item on future agendas for ITPC.

Concluding Remarks

Due to the many conversations that have occurred at TCNJ over the past year, many challenges and opportunities in academic computing have been identified. During this time, I have come to appreciate the amount of effort, skill, thoughtfulness, and caring that emits from

our IT staff. They spend an enormous amount of time ensuring that the college runs smoothly and that technology is available to the academic community. I've also come to appreciate the academic computing advisor position and the bridging effect it can create between the academic community and IT.

During the past year, a number of initiatives have begun. For instance, the formation of the Faculty Data Systems Committee to investigate the assessment needs of the college; the formation of the Teaching and Learning Task Force that examined, in part, a partnership with academia and IT to provide learning opportunities for faculty; the development of the Lunch'n Learn workshops geared to improving IT knowledge in the academic environment; and, the development of an online educational environment built for students to learn about acting ethically and safely in cyberspace.

We still have much to do. The pace of academic change in technology related areas is accelerating. It is a daunting task for the computer savvy person to keep up with this pace; it would be impossible for a teacher not trained in computers to be adept in technology without strong support and direction from the college. We must find cost-efficient ways to bring technical knowledge to the campus and provide opportunities for non-technical faculty to incorporate it into their classroom. We must maintain a competitive edge with our peer institutions, many of whom have a stronger funding opportunity.