Final Deliverable

RFP 3.5.6

Project Number R95R8200361

Technology Tactical Plan

for

Baltimore City Community College

September 15, 2009

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Chapter 1: Introduction

Overview

CampusWorks Inc. has prepared this document, referred to as Technology Tactical Plan, as the final deliverable under Project Number R95R8200361, RPF 3.5.6.

The CampusWorks Inc. (CWI) team conducted an assessment of the technology environment at Baltimore City Community College (BCCC) in the Fall of 2008, and continued its observations and analysis through the Business Process Review completed during Winter/Spring of 2009.

The Technology Assessment (RFP 3.5.2/3.5.6) makes recommendations that position the College toward a best practice, transformational and sustainable technology environment. It does so by recommending remediation tasks (detailed in Appendix A) and an approach that accelerates the College’s progress toward its Vision of Excellence and institutional transformation. Those recommendations are:

- Develop a Best Practice Technology Governance Model
- Implement a Best Practice Technology Support Model
- Reconfigure the CITS Office
- Review Key Business Processes
- Replace Outmoded Administrative Systems
- Implement Document Imaging

These recommendations are the subject of this document. Chapter 2 provides recommendations for technology governance at BCCC. Chapter 3 provides recommendations for moving toward a best practice support model with staffing in CITS the focus of Chapter 4. Chapter 5 provides the summary findings from the Business Process Review completed in Winter/Spring 2009, Chapter 6 provides recommendations for moving forward with replacement of the student information system with an integrated administrative system, and Chapter 7 outlines the approach to institutional document imaging at BCCC. Chapter 8 provides some thoughts on priority setting, given the scope and complexity of the tasks and provide an
integrated five-year schedule for addressing the Technology Assessment’s remediation activities and the recommendations discussed in Chapters 2-7 of this document.

CampusWorks has compiled the recommendations into a five-year timeline that emphasizes the remediation of core services, the acquisition of key products and the restructuring the technology staffing to meet the College’s objectives.

When taken together the Technology Assessment (RFP 3.5.2/3.5.6), Business Process Review (RFP 3.5.3/3.5.6), Enterprise Resource Planning Statement of Work (RFP 3.5.4/3.5.6), Document Imaging Statement of Work (RFP 3.5.5/3.5.6) and this document provide the College with a blueprint for successfully leveraging technology in achieving the College’s strategic Vision of Excellence and transforming the institution, beginning with the recommendations in the Institutional Assessment (RFP 3.5.1/3.5.6).
Chapter 2: Develop a Best Practice Technology Governance Model

Overview

At Baltimore City Community College decisions about technology are generally made by the CIO and the staff in CITS. Priorities are difficult to discern and alignment with institutional priorities is not always clear.

The College should create a formal technology governance structure.

Technology governance provides oversight and direction to ensure that technology management is aligned with the strategic direction of the institution. Governance also ensures that:

- Information Technology policy and procedure is fairly and openly debated and ratified by the College.
- Areas of deficiency are identified and made known in an open and collaborative forum.
- The College has appropriate input into technology strategy.
- The Information Technology department receives appropriate guidance and direction on priorities.
- There is an effective process for decision making on product acquisition. Product acquisition includes the critical issue of buy versus build. Institutional Governance insures that custom development is limited to those narrow business requirements that are truly unique to the College.
- There is an effective process for management of the technology portfolio. This includes the issue of in-source versus out-source of application development and support. The inevitable turnover of the development staff through retirement and resignation coupled with inadequate system documentation put the institution at risk with an applications portfolio supported by external resources.
- Instructional technology / classroom configuration issues are addressed in a manner that conforms to the academic schedule and requirements.
- Accountability for service delivery is established.
At Baltimore City Community College, the absence of effective technology governance contributes to a lack of coherent planning, inefficiencies in the use of technology and associated resources throughout the College and an inability to leverage the resource investments in ways that support the College’s strategic vision and mission.

Colleges often configure committees for the purpose of decision-making. Technology governance, especially at the community college, requires some operating principles, many of which are highlighted in the chapter on support model. For example, if a decision is made to integrate administrative system (student and section) data with the course management system, in accordance with institutional business rules, all constituents must agree to work within those rules. So, if a student has not registered in a class in the administrative system the faculty member cannot expect that the student will be in the course management system. Nor should the faculty member override the registration by enrolling the student in the course management system themselves. The systems approach is one that requires a clear understanding of the processing rules and a willingness to support those rules.

The Technology Lead Committee is composed each year, with the current CIO serving as the conduit to the President’s Staff. This Committee, as observed, provides a forum to report problems or state opinions, but is not organized as a decision-making forum and apparently does not report in to another governing body. While it is important to have opportunities for conversation around technology throughout the College, governance must be more formalized and operate within the Institutional governance structure.

Part of the governance challenge is the lack of an organized technology plan and an organized support structure. Both of these important items provide a framework for coherent and consistent decision making. In the absence of a framework, decisions are made in a reactive, and somewhat ad hoc fashion.

The College leadership and CITS should engage in an open and transparent management approach. A Project Management Office (PMO), as described in Appendix D, can serve as a front door to the projects that are undertaken, as a result of institutional priorities and approvals. The Project Management Office should maintain a Web-based repository of management documents and tools that make what we do and how we do it available to the College.
community. This includes a project list that shows what projects we have on the project list, the priorities, anticipated outcomes, scope of effort, and anticipated due dates.

The broader need is the collaboration with the College about technology. Regular status reviews and planning opportunities should be expected by senior administrators. Typically such efforts include several groups and formats.

- Periodic presentation to the Board of Trustees
- Periodic presentation and review with the Senior Management Team
- Periodic presentation and review by the College Council
- Efforts by an administrative user group
- Formation of an IT governing body representing institutional stakeholders
- Periodic presentation and comment with the College Senate

Establishing these types of working relationships will make institutional decision-making inclusive and transparent and position IT decision making as transformative.
Chapter 3: Implement a Best Practice Technology Support Model

Overview

Central to the College’s technology transformation is implementation of a best practice technology support model. This model, detailed in Appendix B and specific items identified here

Components of the Best Practice Support Model

The components of a best practice support model for technology are:

- Standardization
- Network
- Infrastructure
- Desktop Computers
- Software
- Classroom Technology
- Staff
- 24 x 7 Support
- Knowledgebase
- Identity Management

Standardization

Standardization comes in several forms, but is required in order to support an environment efficiently. Technology staff are able to master a predictable set of software and hardware. Technology users are able to learn and use a consistent environment. Costs are minimized, staff productivity is maximized and support is consistent.

BCCC has standardized on a Microsoft environment for productivity software (Microsoft Office), for email (Exchange) and for servers (Server 2003). Sharepoint is emerging as the standard for collaboration.

What is not standard, and is an important component of the standardization model, is the use of desktop imaging software. Two separate systems are currently maintained, which means that technology staff must know two different environments with two different configurations.
This practice needs to be replaced with one imaging package, and associated servers configured for a consistent and understandable imaging model.

**Network**

The College’s network is the backbone for the College’s technology environment. All communication, administrative systems, office productivity, teaching and learning with technology depend upon a robust, stable, fast and secure network.

The CampusWorks’ technology assessment identified many areas of concern with the College’s network environment. These included slow network connectivity, unreliable wireless connectivity and blocks on certain content in the name of network security. Maintenance contracts, required for critical network systems, do not exist. Warranties have expired and much of the network equipment appears to be reaching its end of life. Network monitoring tools, a standard part of a network managers tool kit, are not in place. As a result, resolving issues reported by users or preventing problems that such tools would proactively identify, is difficult if not impossible.

These limitations mean that staff are working in an environment that is very difficult to support effectively. Costs, both in terms of inefficient use of technology staff time and inability to perform College business, are likely to be high.

It appears that standard network diagrams and system maps do not exist. As a first step the College should thoroughly document its existing environment. It should review the age of all equipment and replace on a standard life cycle. And, network monitoring tools should be implemented.
Infrastructure

Infrastructure is a collective term for all of the pieces of technology that are provided to and used by the client community. The role of infrastructure in the context of the support model is stability, reliability, availability, performance, and ease of use.

When anti-virus software interferes with work or does not identify or fix a problem, when a network printer fails to respond or when access to a shared network folder is unavailable a support call is usually generated. So, infrastructure plans benefit from standardization and monitoring to limit the number of calls.

The CampusWorks assessment identified areas for improvement in the infrastructure along the lines of those identified with the network. Documentation of the infrastructure, including the configuration of the server room, was unavailable. Maintenance contracts appeared missing. And, best practice moves to SANs or virtualization did not appear to be on the horizon for the future.

Desktop Computers

Managing the inventory of desktop computers is a challenge for most institutions. An effective support model eliminates old equipment – the costliest to support – and implements a predictable replacement model. Typically desktops have a life span of about five years and laptops four. Analyzing the inventory and developing such a life cycle plan supports:

- Predictable technology budget planning
- Comprehensive inventory controls
- Standard hardware platforms across the institution
- Standardization of software based on the minimum hardware standard
- Improved support model based on standard hardware and software

BCCC needs to implement a comprehensive life cycle replacement plan quickly, with particular emphasis of providing laptops to faculty, adequate technology for classrooms and appropriate desktop systems for administrators using the new ERP software.
Software

BCCC has standardized on the Microsoft produce line for most of its office productivity, email, collaboration and server software. Other applications are provided as required, for specific business needs or teaching and learning requirements.

As part of supporting standardization and distribution of operating system patches, anti-virus updates and other desktop adjustments a standard desktop imaging environment is required. Currently two different systems are maintained. This is inefficient and confusing, and does not enable the College to take advantage of the benefits of imaging. One system should be used for all imaging requirements, and images standardized by classroom, business function or user role.

Classroom Technology

BCCC has made significant investment in physical classroom technology and in virtual classroom technology. The CampusWorks’ technology assessment makes suggesting for improving those environments, with specific reference to the life cycle replacement needs of many classrooms that are equipped with old technology, the need for remediation for usability in some classrooms, and the general need to standardize the classroom environment so as to maximize the teaching and learning and minimize the support.

As new classrooms are brought online as smart classrooms the cabling and wiring plans need to be configured to provide the best environment for teaching and learning.

A complete inventory of classroom technology needs to be developed, that itemizes the technology in each classroom, identifies the consumables in use so that stock can be maintained and ensures that documentation regarding the use of technology in a particular room can be written and maintained.
Staff

The technology support model depends on a well trained staff, who are equipped with the tools they need to do their job. It also depends on creating a technology environment that is supportable. BCCC lacks metrics to determine the types of calls, response time or other factors that could measure the supportability of the current environment. Observations indicate that the current environment needs to be reconfigured to make it supportable at the current staff levels, and for the future as staffing is reorganized. This subject is detailed in the following chapter.

24x7 Support and Outsource

BCCC is staffed to support technology in a standard 8 hour a day, 5 days a week, 52 weeks a year. However, the work of the College extends to 24 hours a day, 7 days a week and 52 weeks a year.

It is not cost effective to staff such a support model by hiring staff. A number of outsourcing options have developed over the past few years, as this challenge has been faced by many institutions. One that is quite well known is Presidium. They have a particular expertise in Blackboard, but can be contracted with to provide support for all College applications. This is not the only solution. The College should investigate their options for this type of service as part of its technology transformation initiative.

Metrics and Knowledgebase

In order to properly manage technology support two tools are essential: a help desk management system and a knowledgebase. The help desk management system tracks all requests for support, allows for assignment of tasks, has an escalation mechanism and automates responses to requesters in a timely and understandable way. This system should also allow for reporting on transactional metrics – how many calls are made during a month, what is the average time from report to completion, and what is the workload. Additionally report analysis should allow the help desk manager to identify patterns and trends that point to issues that are affecting more than one user.

BCCC has a package calls HelpStar in user. However, the use is not universal and the implementation is lacking some of the essential tools. All staff should be using HelpStar to track
their work and CITS management should use that tool to help in staff allocation and problem resolution.

A knowledgebase solution adds to the efficiency and quality of service provided by help desk support staff. Common problems should have common answers. Technicians should have access to that information and users can often be self-supporting if they have access to the appropriate information. The knowledgebase should contain

- Best Practice answers to technical questions
- Repository for institutional process and procedure materials
- Documentation on use of systems or business processes
- How-To’s (ex: How do I connect to the wireless network?)

To be effective, the Knowledgebase must:

- Be available, preferably through the portal
- Contain useful information
- Contain information that is clear

BCCC does not have a knowledgebase at this time. One should be developed and deployed as part of the implementation of a best practice support model.

**Identity and Access Management**

While metrics on BCCC’s support calls are not available, anecdotally it was reported that the most common call to the helpdesk was related to user names and passwords. This conforms to the industry metric that nearly 70% of calls to help desks, at institutions that do not have an identity management (iDM) solution are related to usernames and passwords.

Two things can help alleviate that problem. One is to develop a self-service password reset interface for users. However, this relies upon a predictable user name and other verifications that may not be immediately available to the user in the absence of iDM.

So, the College must begin the process of implementing the second tool – which is an identity management solution. BCCC currently licenses the Microsoft tool for iDM – the Integrated Lifecycle Manager. For this tool to be effective it must be fed information about identity from systems that are identified as the sole authoritative source of identity. Herein lies
the biggest challenge to an iDM solution: no one system is the system of record for student nor employee identity. Once that problem is solved, iDM can be implemented.
Chapter 4: Reconfigure the CITS Office

Overview

The current organization of CITS needs to be changed to that supports the needs of the institution and of the CITS staff. In the Technology Assessment CampusWorks suggested a process of moving from the current model to a transformational model to a steady state model that would support technology at the College in the new institutional and technological environment to which it aspires. The transformational model needs to be implemented now, with attention to assigning current staff to positions for which they are most qualified, and that align to the current and future tasks. As important, job descriptions, performance reviews and professional development plans need to be developed and aligned.

The IT Organization

The CITS organizational recommendations identified in the CampusWorks Technology Assessment focused on the move toward a Best Practice Technology Support Model within the structure depicted below:
At the heart of an effective Technology Support Model is a well trained staff that has the tools necessary to do their jobs. The need for responsive, timely, and effective support begins with the creation of an organization and technology environment that can be supported. Steps recommended throughout this document are necessary to achieve the starting point of an effective support model. These actions will define a scope of responsibility that a trained and motivated professional staff can support effectively.

One important attribute of a successful support model is the existence of a problem solving hierarchy that addresses the need to apply increasingly skilled or specialized resources to problems that are more complex or resistant to resolution. To accomplish this, we must establish a tiered hierarchical support structure to respond to all manner of technology support requirements. All personnel within the IT organization will fall within the tiered support structure. That hierarchical structure includes:

**Tier 1** – is the first level of support provided by the Help Desk, desktop and media analysts and service personnel. All support requests are initiated, recorded, tracked and when possible, serviced at this Tier for student, faculty and staff.

**Tier 2** – involves technical support requirements of a more specialized, complex or lengthy nature that require the skills of more senior or specialized service personnel, which would include senior analysts and engineers.

**Tier 3** – addresses the most complex or extensive service requirements which may involve policy or procedural issues and would affect multiple users or user groups.

Tier 1 personnel deployed by the Help Desk will be composed of staff within a family of Tier I Analyst job descriptions. The anticipated job levels might be; Help Desk Tier I Analyst, Senior Help Desk Tier I Analyst, and Lead Help Desk Tier I Analyst. Each of the tree levels will have specific duties assigned and minimum skill levels. The skill levels will be in the form of work experience, academic credentials, and technical certifications. During the implementation of the Support Center, staff will be assigned to one of the three job descriptions based on their qualifications, and work experience. Staff deficient in requirements for the assigned job level will be provided training to gain the required skills. Training progress and job performance will be managed through the performance review process.
To meet these goals the following actions should be taken.

**Review and Update All Job Titles and Descriptions**

Job titles and descriptions are badly out of date throughout the department. Job titles and job descriptions for each position must be reviewed and updated. Job descriptions will include skill level requirements such as certifications and academic credentials. The goal should be to craft job descriptions in job families so that staff have career growth opportunities as additional certifications and academic credentials are achieved.

Current CITS Job Titles include, alphabetically:

- Academic Lab Coordinator
- Administrative Coordinator
- Chief Information Officer
- Communications Engineer 1
- Computer Information Specialist
- Computer Network Specialist
- Computer Network Specialist 2
- Computer Operations Manager
- Computer Operations Specialist
- Computer User Support Specialist
- Coordinator of English Computer Lab
- Data Security Specialist
- Director, Campus Resources Group
- DP Programmer
- Help Desk Supervisor
- Infrastructure/Security Network Technician
- Media Services Technician
- P/C Supervisor
- Programmer Analyst
- Quality Assurance Coordinator
- Security Information Specialist
- Systems Analyst
- Telcom – Voice Technician
The current organization has most staff reporting into one supervisor in a flat, non-hierarchical structure. Typical job titles in an organization using the best practice technology support model include:

- Help Desk Tier 1 Analyst
- Senior Help Desk Tier 1 Analyst
- Lead Help Desk Tier 1 Analyst
- Network Technician
- Senior Network Technician
- Network Architect
- System Administrator
- Programmer
- Programmer Analyst
- Systems Analyst
- Data Base Administrator
- Supervisor/Manager Customer Service
- Supervisor/Manager IT Infrastructure
- Supervisor/Manager Enterprise Applications

We recommend a reconfiguration of current titles to these structures, replacing the current non-hierarchical structure with one that reflects clear lines of authority and responsibility.

**Develop a Training Plan for All IT Personnel**

The job families concept is intended to extend vertically throughout the IT organization so that staff have opportunities for vertical growth into senior positions, commensurate with institutional needs and qualifications of staff. During implementation of the re-organization, supervisors will conduct a skills assessment interview with each subordinate staff member. The outcome of the skills assessment will be a training plan for each staff member. Training plans will be monitored by supervisors through the performance review process.

The training plan should be derived from the requirements of the job description for each staff member and the skill level of the staff member. The training plan is monitored by
supervisors as a part of the performance review process. A typical training plan used for Help Desk staff using resources may look like the following:

<table>
<thead>
<tr>
<th>Staff Name</th>
<th>Certifications Earned</th>
<th>In Progress</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Smith</td>
<td>None</td>
<td>A+ Essentials</td>
<td>A+ Certification: Practical Application&lt;br&gt;A+ Certification: Network&lt;br&gt;A+ Certification: Security</td>
</tr>
<tr>
<td>Mary Smith</td>
<td>A+ Essentials</td>
<td>A+ Network</td>
<td>A+ Certification: Security&lt;br&gt;MCSE – Microsoft Certified Systems Engineer</td>
</tr>
</tbody>
</table>

The training plan for specific personnel will, as stated previously, depend upon each individual’s academic credentials, experience, and skills or certifications already achieved. Additionally, some personnel with comparable titles may have specific technical responsibilities that suggest specialized training in that discipline, and training in new applications for student and document management, for instance, must be provided by the selected vendors. For the job titles within the support model included above the training and certification may include the following, in addition to requisite academic credentials:
<table>
<thead>
<tr>
<th>Position</th>
<th>Certifications or Training Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help Desk Tier 1 Analyst</td>
<td>A+ Essentials</td>
</tr>
<tr>
<td>Senior Help Desk Tier 1 Analyst</td>
<td>A+ Essentials, A+ Practical Application, A+ Network</td>
</tr>
<tr>
<td>Lead Help Desk Tier 1 Analyst</td>
<td>A+ Essentials, A+ Practical Application, A+ Security, A+ Network</td>
</tr>
<tr>
<td>Network Technician</td>
<td>MCSE, CCNA</td>
</tr>
<tr>
<td>Senior Network Technician</td>
<td>MCTS, CCNET, CCNP</td>
</tr>
<tr>
<td>Network Architect</td>
<td>MCA, CCNP, CCDP, CCIE, SSCP</td>
</tr>
<tr>
<td>System Administrator</td>
<td>MCSE, MCSA</td>
</tr>
<tr>
<td>Programmer</td>
<td>SQL, ERP Vendor specific</td>
</tr>
<tr>
<td>Programmer Analyst</td>
<td>SQL, ERP Vendor specific</td>
</tr>
<tr>
<td>Systems Analyst</td>
<td>ITIL, SQL, ERP Vendor specific</td>
</tr>
<tr>
<td>Data Base Administrator</td>
<td>MCDBA, ERP Vendor specific</td>
</tr>
<tr>
<td>Supervisor/Manager Customer Service</td>
<td>A+ Essentials, A+ Practical Application, A+ Security, A+ Network, MCTS</td>
</tr>
<tr>
<td>Supervisor/Manager IT Infrastructure</td>
<td>MCSA, CCIE, SSCP, ITIL, CISSP</td>
</tr>
<tr>
<td>Supervisor/Manager Enterprise Applications</td>
<td>ITIL, SQL, ERP Vendor specific</td>
</tr>
<tr>
<td>Chief Information Officer</td>
<td>ITIL, SQL, ERP Vendor specific</td>
</tr>
</tbody>
</table>
Implement Lifecycle Management

One of the Best Practices that will significantly impact the IT organization and staffing is lifecycle management. As discussed, CampusWorks strongly encourages implementation of a lifecycle management strategy for desktop computers. An outcome of this activity is that the desktop inventory is on warranty. Hardware repairs are done by the vendor, not institutional staff. Staff previously committed to servicing hardware can be retrained and reallocated to the Help Desk Tier 1 support group.

Implement Standard Software for Desktop Management

CampusWorks strongly recommends implementation standard software using a single centrally managed software image product. An outcome of this activity is that staff need to make ‘house calls’ only on very rare occasions. Staff previously committed to servicing desktop equipment in the field can be retrained and reallocated to the Help Desk Tier 1 support group.

IT Staff Requisites and Certifications

The academic qualifications, experience and professional credentials of staff members will determine the responsibilities assigned and the placement of individuals within the organization. When job descriptions are reviewed and revised each will contain appropriate minimum levels of competency. The following pages describe a series of commonly accepted IT Certifications from a variety of vendors and independent organizations. These, along with other training and skill determinants will be used within the training plan for each of the members of the IT organization.
### COMPTIA - A+ Certifications

A+ certifications most relevant to the BCCC support staff are identified here. These certifications ensure non-vendor specific competency in the basic support and maintenance of desktop, laptop, hardware, network and related systems. All Tier 1 support personnel will require one or more of these certifications.

<table>
<thead>
<tr>
<th>Certification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CompTIA A+ Essentials:</strong></td>
<td>measures the necessary competencies of an entry-level IT professional with at least 500 hours of hands-on experience in the lab or field. It tests for the fundamentals of computer technology, networking and security, as well as the communication skills and professionalism now required of all entry-level IT professionals.</td>
</tr>
<tr>
<td><strong>CompTIA A+ Practical Application:</strong></td>
<td>is an extension of the knowledge and skills identified in CompTIA A+ Essentials, with more of a &quot;hands-on&quot; orientation focused on scenarios in which troubleshooting and tools must be applied to resolve problems.</td>
</tr>
<tr>
<td><strong>The CompTIA Network+:</strong></td>
<td>is an international, vendor-neutral certification that proves a technician’s competency in managing, maintaining, troubleshooting, installing and configuring basic network infrastructure.</td>
</tr>
<tr>
<td><strong>CompTIA Security+:</strong></td>
<td>is an international, vendor-neutral certification that proves competency in system security, network infrastructure, access control and organizational security. Major organizations that employ CompTIA Security+ certified staff include Booz Allen Hamilton, Hewlett-Packard, IBM, Motorola, Symantec, Telstra, Hitachi, Ricoh, Lockheed Martin, Unisys, Hilton Hotels Corp., General Mills, the U.S. Navy, Army, Air Force and Marines.</td>
</tr>
</tbody>
</table>
Microsoft Certifications

The College operates a Microsoft environment. The most popular Microsoft certifications are listed below, with the most relevant to the BCCC support staff identified in bold. These certifications, by Microsoft, ensure competency in the products and systems created and distributed by Microsoft. Selected Tier 1 and Tier 2 support personnel may require one or more of these certifications.

<table>
<thead>
<tr>
<th>IT professional</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MCTS</strong></td>
<td>A Microsoft Certified Technology Specialist (MCTS) certification enables IT professionals to target specific technologies and to distinguish themselves by demonstrating in-depth knowledge and expertise. Examples might relate to SQL Server or SharePoint technologies.</td>
</tr>
<tr>
<td><strong>MCITP</strong></td>
<td>A Microsoft Certified IT Professional (MCITP) certification enables IT professionals to demonstrate comprehensive skills in planning, deploying, supporting, maintaining, and optimizing IT infrastructures.</td>
</tr>
<tr>
<td><strong>MCDST</strong></td>
<td>A Microsoft Certified Desktop Support Technician (MCDST) certification enables IT professionals to demonstrate technical and customer service skills in troubleshooting hardware and software operation issues in Microsoft Windows environments.</td>
</tr>
<tr>
<td><strong>MCSA</strong></td>
<td>A Microsoft Certified Systems Administrator (MCSA) certification enables IT professionals to demonstrate their ability to administer network and systems environments that are based on the Windows operating systems. Specializations include the MCSA: Messaging and the MCSA: Security.</td>
</tr>
<tr>
<td><strong>MCDBA</strong></td>
<td>A Microsoft Certified Database Administrator (MCDBA) certification enables IT professionals to demonstrate their ability to design, implement, and administer Microsoft SQL Server databases.</td>
</tr>
<tr>
<td><strong>MCSE</strong></td>
<td>A Microsoft Certified Systems Engineer (MCSE) certification enables IT professionals to demonstrate their ability to design and implement an infrastructure solution that is based on the Windows operating system and Windows Server software. Specializations include the MCSE: Messaging and the MCSE: Security.</td>
</tr>
<tr>
<td>Microsoft Certified Business Management</td>
<td>A Microsoft Certified Business Management Solutions Specialist certification enables IT professionals to demonstrate their proficiency with Microsoft Dynamics and related business products.</td>
</tr>
<tr>
<td>Solutions Specialist</td>
<td>A Microsoft Certified Business Management Solutions Professional Certification enables IT professionals to demonstrate professional proficiency with Microsoft Dynamics in one of three areas: applications, developer, or installation and configuration.</td>
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<tr>
<td>Microsoft Certified Business Management Solutions Professional</td>
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<tr>
<td><strong>Developer</strong></td>
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<tr>
<td>MCPD</td>
<td>A Microsoft Certified Professional Developer (MCPD) certification enables IT professionals to demonstrate comprehensive skills in designing, developing, and deploying applications for a particular job role. These certifications show that you have the skills required to perform the job successfully.</td>
</tr>
<tr>
<td>MCAD</td>
<td>A Microsoft Certified Application Developer (MCAD) certification enables IT professionals to demonstrate their ability to use Microsoft technologies to develop and maintain department-level applications, components, Web or desktop clients, or back-end data services.</td>
</tr>
<tr>
<td>MCSD</td>
<td>A Microsoft Certified Solution Developer (MCSD) certification enables IT professionals to demonstrate their ability to design and develop leading-edge business solutions with Microsoft development tools, technologies, platforms, and the Windows operating system.</td>
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<tr>
<td><strong>Advanced certifications</strong></td>
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<tr>
<td>Microsoft Certified Master</td>
<td>The Microsoft Certified Master program enables experienced IT professionals to demonstrate and validate their ability to successfully design and implement solutions that meet the most complex business requirements.</td>
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<tr>
<td>Microsoft Certified Architect</td>
<td>The Microsoft Certified Architect program recognizes and provides advanced certification to practicing architects in an enterprise setting.</td>
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<td><strong>Home and office user</strong></td>
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<tr>
<td>MCAS</td>
<td>A Microsoft Certified Application Specialist (MCAS) has advanced business skills with the 2007 Microsoft Office system and Windows Vista.</td>
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<tr>
<td>MOS</td>
<td>A Microsoft Office Specialist (MOS) is globally recognized for demonstrating advanced skills in using Microsoft desktop software.</td>
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<tr>
<th><strong>Trainer</strong></th>
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<tr>
<td>MCT</td>
<td>A Microsoft Certified Trainer (MCT) certification enables IT professionals to demonstrate they can successfully deliver Microsoft training courses to IT professionals and developers.</td>
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<tr>
<td>MCLC</td>
<td>The Microsoft Certified Learning Consultant (MCLC) credential recognizes Microsoft Certified Trainers (MCTs) whose job roles have grown to include frequent consultative engagements with customers. These MCTs are experts in designing and delivering customized learning solutions.</td>
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</table>
Other Information Systems Related Certifications

The challenges of moving the College forward and addressing the ever growing challenges in project management, process management and security will require of staff in some of the following areas.

<table>
<thead>
<tr>
<th>Certificate</th>
<th>Description</th>
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<tbody>
<tr>
<td>CISSP</td>
<td>Certified Information System Security Professional - an independent information security certification governed by the not-for-profit International Information Systems Security Certification Consortium, commonly known as (ISC).</td>
</tr>
<tr>
<td>SSCP</td>
<td>System Security Certified Practitioner - is a vendor-neutral Information Security certification governed by the non-profit International Information Systems Security Certification Consortium (commonly known as (ISC).</td>
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<tr>
<td>GSE</td>
<td>GIAC Security Expert - Global Information Assurance Certification (GIAC) is an information security certification entity that specializes in technical and practical certification as well as new research in the form of its GIAC Gold program. SANS Institute founded the certification entity in 1999 and the term GIAC is trademarked by the Escal Institute of Advanced Technologies.</td>
</tr>
<tr>
<td>PMP</td>
<td>Project Management Professional- is a credential offered by the Project Management Institute (PMI®). Per 30 June 2009, there were 359,973 PMP certified individuals distributed globally. The credential is obtained by documenting 3 or 5 years work experience in project management, completing 35 hours of project management related training, and scoring a certain percentage of questions on a written, multiple choice examination.</td>
</tr>
<tr>
<td>ITIL</td>
<td>Information Technology Infrastructure Library - ITIL Certifications are managed by the ITIL Certification Management Board (ICMB). The Board includes representatives from interested parties within the community around the world. The Information Technology Infrastructure Library (ITIL) also known as Infrastructure Management Services (IMS) is a set of concepts and policies for managing information technology (IT) infrastructure, development and operations.</td>
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</table>
CISCO Certifications

The current network environment is predominated by CISCO equipment. Since most of it is outdated and in need of replacement, that project will is a priority project. Staff supporting that network will require training in the new technology – implementation, use and maintenance. While a supplier will likely be engaged to support the one-time architecting of the system, understanding that architecture will be important, as will the ongoing support.

The most popular CISCO certifications are listed below along with the certification paths for specializations. These certifications, by CISCO, ensure competency in the products and systems created and distributed by CISCO, many of which are in use by BCCC. Selected Tier 2 support personnel may require one or more of these certifications.
<table>
<thead>
<tr>
<th>Architect Certification</th>
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<tr>
<td><strong>Design</strong></td>
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<tr>
<td>Cisco Certified Architect</td>
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<th>General Certifications</th>
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<td><strong>Certification Paths</strong></td>
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<th>Entry-Level</th>
<th>Associate</th>
<th>Professional</th>
<th>Expert</th>
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<tr>
<td>Routing &amp; Switching</td>
<td>CCENT</td>
<td>CCNA</td>
<td>CCNP</td>
<td>CCIE Routing &amp; Switching</td>
</tr>
<tr>
<td>Design</td>
<td>CCENT</td>
<td>CCNA &amp; CCDA</td>
<td>CCDP</td>
<td>CCDE</td>
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<tr>
<td>Network Security</td>
<td>CCENT</td>
<td>CCNA Security</td>
<td>CCSP</td>
<td>CCIE Security</td>
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<tr>
<td>Service Provider</td>
<td>CCENT</td>
<td>CCNA</td>
<td>CCIP</td>
<td>CCIE Service Provider</td>
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<tr>
<td>Storage Networking</td>
<td>CCENT</td>
<td>CCNA</td>
<td>CCNP</td>
<td>CCIE Storage Networking</td>
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<tr>
<td>Voice</td>
<td>CCENT</td>
<td>CCNA Voice</td>
<td>CCVP</td>
<td>CCIE Voice</td>
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<tr>
<td>Wireless</td>
<td>CCENT</td>
<td>CCNA Wireless</td>
<td>CCNP Wireless</td>
<td>CCIE Wireless</td>
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## CISCO Certification Legend:

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<tr>
<th>Certification</th>
<th>Description</th>
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<tr>
<td><strong>CCENT</strong></td>
<td>Cisco Certified Entry Networking Technician (CCENT™) validates the ability to install, operate and troubleshoot a small enterprise branch network, including basic network security.</td>
</tr>
<tr>
<td><strong>CCNA</strong></td>
<td>Cisco Certified Network Associate (CCNA®) validates the ability to install, configure, operate, and troubleshoot medium-size route and switched networks, including implementation and verification of connections to remote sites in a WAN.</td>
</tr>
<tr>
<td><strong>CCNP</strong></td>
<td>Cisco Certified Network Professional (CCNP®) validates knowledge and skills required to install, configure and troubleshoot converged local and wide area networks with 100 to 500 or more nodes.</td>
</tr>
<tr>
<td><strong>CCIE</strong></td>
<td>Cisco Certified InterNetwork Expert (CCIE - discipline®) This Expert level certification validates skills at an expert level in one or more vertical disciplines, such as “Routers and Switches”, “Storage”, “Security”, etc.</td>
</tr>
<tr>
<td><strong>CCDA</strong></td>
<td>Cisco Certified Design Associate (CCDA®) validates knowledge required to design a Cisco converged network.</td>
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<tr>
<td><strong>CCDP</strong></td>
<td>Cisco Certified Design Professional (CCDP®) validates advanced knowledge of network design concepts and principles.</td>
</tr>
<tr>
<td><strong>CCDE</strong></td>
<td>Cisco Certified Design Expert (CCDE™) validates advanced network infrastructure design principles and fundamentals for large networks.</td>
</tr>
<tr>
<td><strong>CCSP</strong></td>
<td>Cisco Certified Security Professional (CCSP) validates advanced knowledge and skills required to secure Cisco networks.</td>
</tr>
<tr>
<td><strong>CCIP</strong></td>
<td>Cisco Certified Internetwork Professional (CCIP®) validates advanced knowledge and skills required to manage service provider infrastructures.</td>
</tr>
<tr>
<td><strong>CCVP</strong></td>
<td>Cisco Certified Voice Professional (CCVP®) validates advance knowledge and skills required to integrate into underlying network architectures.</td>
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Chapter 5: Review Key Business Processes

Overview

The Business Process Review at Baltimore City Community College encompassed most of the major administrative offices of the College. The areas chosen for review were a direct result of the Institutional and Technology Assessments. The detailed information is included in *Baltimore City Community College Business Process Review, RFP 3.5.3/3.5.6, September 1, 2009*. A summary of the finding follows, grouped by these areas: Admissions, Registration, Financial Aid, Catalog and Schedule, Degree Audit, BCED, HR/Hiring, Grants, Procurement and IT Support Model.

In general, we recommend that all offices of the College continue to examine their processes by viewing them all from the student’s perspective. One example demonstrates the disconnect between business need and student difficulties. On occasion students are withdrawn from a course by mistake – either an instructor mistake or an administrative error. Despite the fact the student is not responsible for the mistake, they are held responsible for the correction. They are required to get a form and have it signed, in person, by the instructor and dean and then deliver the form to the registrar for subsequent processing. While this is happening, they can have their access to needed academic resources removed and, as a result, may not be able to get back on track for success in their coursework because of the lost time. This example was discussed as part of the business process review and is being changed. But, it serves as an example of why it is so very important for the student’s experience to be identified and simplified wherever possible. Not only does such perspective provide for a better student experience, but it also supports the enrollment and retention initiatives so important for the College.

The College should also use the BPR approach to continue to review processes in other areas that were not part of this project. Specifically, an analysis of the student billing / accounts receivable and the web presence areas is recommended, as part of the process reconfigurations generated by the findings that follow.
Admissions

Early Enrollment Admissions Process

- All separate and “sidelined” systems need to be fully integrated and provide a reporting function that is flexible, dependable and puts the staff in control of data reporting requirements. An integrated system would decrease the need for the time consuming responsibility of maintaining paper logs, lists and independent desktop systems. Furthermore, these multiple data sources challenge the validity and integrity of student data and impose additional effort on BCCC staff to coordinate that data between and among departments.
- Review the Early Enrollment process to ensure that tracking methods are in place for monitoring high school students for the duration of their initial semester. Tracking will reduce the need for data revisions as well as reduce the amount of additional paperwork that will need to be generated for audit purposes.
- Review Admissions resources availability during peak periods and provide solutions to ensure that high school students are appropriately prepared and counseled throughout the BCCC registration process.
- As paper files continue to grow and office space remains the same, the need for a document imaging system becomes critical and offers a long-term component for an integrated system. Furthermore, without an imaging system, the time required to file, retrieve, fax, copy, and overnight documents on a continuous basis diminishes BCCC staff’s productivity.
- An Ad hoc reporting functionality coupled with the need for an integrated system will present the BCCC staff with a more flexible self-servicing reporting tool that supports summaries, subtotals, calculations, formats, and flexibility and further enhances the staff’s understanding of the data structure to meet individual reporting requirements.

New Student Admissions Process (Traditional)

- A fully integrated system to include an electronic tracking system is fundamental for validating and maintaining student inquiries. The system would record basic student information and a summary of the inquiry. This would enable BCCC to effectively track potential students and to provide data for recruitment and counseling activities. Also this information could be used as a metric for evaluating recruitment activities.
- Synchronizing COLLEGE and SAFER will produce the following results:
  a) Enable prospective students to pay his/her application fee as soon as they submit an application to BCCC and reduce the built-in delays that prospective students currently face.
b) Eliminate the data irregularities between the systems, which will produce uniform student data.

- An ad hoc reporting system would provide the ability to access and analyze data, to maintain data and to respond with accurate and timely information for BCCC’s statewide and regional reporting requirements. Furthermore, the use of a reporting tool that is web-enabled would provide BCCC with the capability of producing real-time reports that can be customized and reused as necessary.

- A document management system would greatly improve productivity and resolve storage issues within the Admissions office. It would give BCCC the ability to record and store electronically submitted documents to BCCC. It would reduce to a matter of seconds the time it takes to check and see if a prospective student has submitted all of the proper paperwork to attend the college. It also improves customer service by enabling staff to respond to student inquires in a timely matter. Furthermore, it would reduce the need to store paper copies and minimize the use of paper file cabinets.

**New Student Admissions Process (International)**

- Given the quantity of paperwork that is required for international students, a fully integrated method for tracking International Students’ progress should be implemented and access should be granted to those Admissions representatives who are responsible for monitoring international student progress throughout the entire admissions process. A coding system should be defined for maintaining and identifying applicable international student data such as residency status and transcript information.

- Prospective international students should have a self-service application that provides them with the ability to track the status of his/her required documents. This self-service application would additionally benefit prospective students by providing a means for requesting additional information or materials as well as by providing a means for international students to confirm that his/her data is accurate.

- The tracking of all incoming communications (phone, email, and walk in) which is currently performed in an excel spreadsheet for International students, needs to be integrated with other student systems to enable Admissions to monitor the status of incoming international students and to maintain accurate and complete data.

- The Admissions staff should be given the proper access to apply the $10 application fee to an international student’s record. This would reduce the amount of time that the student needs to wait until he/she is cleared for registration. Furthermore, Admissions would not have to rely on another department to update student data.

- Within an integrated system, provide an automatic warning to the Admissions office regarding international students who have changes in registration. These changes could violate VISA restrictions, the Department of Homeland Security and United States laws.
Transcript Evaluation Process

- The Admissions office needs to have the ability to store in COLLEGE the decision related to course equivalencies. This will standardize the decisions and provide a better and consistent method for evaluating transcripts.
- A document management system would greatly improve the quality and reduce the response time within the Admissions office. It would give transcript evaluators the ability to locate transcripts quickly without the need to go through endless folders in a file cabinet. It will enable evaluators to instantly view the transcript when solicited by a student inquiry.

Registration

Student Registration Process

- The technology that currently exists does not work in support of multi-departmental access demands. Data are not effectively shared between registration and student accounting and therefore the registration staff is limited in assisting the student with finalizing his/her coursework. Students are faced with the time consuming process of visiting additional departments to discuss obstacles (“hard stops” or “blocks”) that prevent them from being cleared for registration activities. Timely and well-thought through procedures need to be implemented within an integrated solution to support student enrollment and retention and make the student experience qualitatively better.
- The quantity of required paperwork to register (new/returning/transfer) students is overwhelming. Registration, financial aid, student accounting and advising staff must do an enormous amount of work to create the appropriate flow of hard copy (BCCC official) paperwork for students to register. As a result of this volume of paper, there is duplication of effort, discrepancies and gaps in information generated by the different offices, and no consistent and coordinated communication between departments. Integrating data and providing on-line services to reduce paperwork is essential. This will greatly improve staff productivity, reduce redundancies, gaps and misplaced information, maintain a “greener” approach to processing student data, and most importantly, provide efficient and effective service to the student.

Veterans Registration Process

- Provide a self-service application for veteran students to submit information prior to meeting with the Veteran Counselor. This would eliminate the need for the Veteran Coordinator to spend time entering data during the initial meeting with the veteran and expedite the eligibility process. This information needs to be integrated with other
student systems to enable more efficient processes between the Veteran Affairs Office, Admissions and Student Accounting.

- Update the advisor training curriculum to include rules and regulations for students who receive the GI Bill. This update of the curriculum will reduce the number of GI Bill recipients who mistakenly register for improper coursework and will reduce the number of outstanding tuition balances.
- COLLEGE should send a notification to the Veteran Affairs Office alerting the coordinator when a GI bill recipient has withdrawn from a course, thus reducing the need for the Veteran coordinator to create a daily report. Furthermore, billing adjustments should automatically be made to the student’s account.

**Student Information Changes**

- Making changes to student information within the numerous BCCC systems is not inconsequential. Data is not integrated nor effectively shared between and among critical registration and instructional departments to create the appropriate and time sensitive flow of consistent and valid information. Staff is severely handicapped by lack of official procedures for enforcing timely data entries or modifications of student information. Failure to develop and enforce procedures will continue to serve as impediments and limit the College’s ability to enroll, retain and service students and community constituents in appropriate ways.
- Students, who move within the state and have no change in residency status for billing reasons, have no current automatic method for making changes to their place of residency. A self-service mechanism to log onto their online accounts and update their contact information should be implemented. This would reduce the time required to visit the registration office, wait in line, fill out paper work and submit the required information. Furthermore, staff would be more effective in their roles to serve students in need of more substantial issues.
- Coordination and collaboration is vital to the consistency of student information and the verbal direction that is given to the student. Changes to academic records are not always clear and students, faculty, staff and administration are faced with the dilemma of resolving issues that are not apparent. “Blocks” and “Hard Stops” should be “stamped” (associated) with a BCCC administrator, to include the date, so that the correct source can be notified for clarification. A system that is integrated and includes operator/date stamps (codes) is effective, reliable and efficient when servicing students.
- An all encompassing, integrated system would reduce hindrances for students who must visit multiple offices to resolve varying issues. Because of the disjointed service there are unjustified delays in making necessary adjustments to student records, whether it is for grade changes, address changes or reinstatements. A student should be provided with
a “one-stop” shop where all issues can be directly resolved and access to various data should be provided to that staff on behalf of other departments that are impacted.

- A departmental ad hoc reporting mechanism must be provided to allow for improved decision making and to encourage independence and initiative. Reliance on CITS services that are not adequately knowledgeable of the business functionality may not develop reports that are accurate and usable. Furthermore, relying on CITS when schedules and priorities are not recognized, results in departmental delays for analyzing and validating data.

- Forms that students, faculty, and administration are required to manually complete and validate should be automated and a workflow built for processing them. Additionally, forms should be indexed and proper instructions should be provided.

- Faculty should be held accountable for timely input and processing of student data, most importantly during end-of term input and processing when students are awaiting grades, transcripts and graduation. Schedules/calendars for grade input and processing must be electronically posted and reminders distributed periodically in advance of deadlines.

- Bulk mail that is sent out from BCCC should have the originating department on the return address label so that Records and Registration is not faced with volumes of returned mail to sort through and to manually update in COLLEGE. Subsequently, all departments should have the appropriate access to enter the mail indicator (currently “9999”) onto the student’s record.

**Transcript Request Process**

- Providing online services to students, faculty and staff will keep with BCCC’s going green theme. On-line services beyond those currently available would eliminate or decrease manual, labor-intensive, and duplicative processes and would automatically validate and secure data that is being requested or processed. Additionally, providing a secure credit card self-service function gives students, faculty and staff greater control over the intent of their information and allows for accurate and timely processing of requests. An automatic letter generation process should be implemented for all transcript request forms or letters that are not completed correctly and/or that do not include the $5 transcript fee. There are currently volumes of letters that are rejected and resources are allocated for this purpose that could be used more effectively and with greater intentionality.

- An integrated solution to recording and maintaining student information is critical to the student experience, staff productivity and overall data integrity. Cross-referencing data across multiple systems (COLLEGE/Excel/Access) is fragmented resulting in inconsistencies, liabilities and delays with producing legitimate information. A single integrated source would encourage greater departmental independence and reduce
duplicate or overlapping services to the student. Furthermore, access rights need to be thoroughly thought through between and among departments who touch similar data for decision making purposes and to maximize resources for greater efficiency and effectiveness.

**Graduation Application Process**

- In view of the fact that they know all the program requirements, updates, equivalencies, waivers, and substitutions, curriculum coordinators in conjunction should be responsible for assisting students throughout the graduation application process to be certain that all degree requirements/certificate requirements have been met. A valid and current Degree Audit system will aid the curriculum coordinator with providing accurate and consistent guidance to students, faculty and advisors.

- The graduation application process is time-consuming and has the potential for allowing varying interpretations of academic requirements from one curriculum coordinator to another. This process involves manually compiling a variety of student records (such as transcripts) and then determining through a manual degree-progress evaluation which major, minor, and other degree requirements remain to be completed. It also involves later manual review of these initial applications to verify that requirements which were not previously completed now have been. Substitutions for missing courses must be reviewed further.

- Timely processing of substitutions and/or waivers is crucial to the student’s correct degree requirements, thus reducing the need to compile other student records for verification as well as eliminating the need to create information manually. The Degree Audit system needs to show current information; thereby decreasing the amount of manual adjustments that may not be consistent college-wide.

- Keeping BCCC’s Catalog Master, Master Schedule and Degree Audit systems current will require ongoing maintenance and approval by several BCCC academic departments. Discrepancies are pervasive and challenging to the curriculum coordinators who are assisting potential graduates with accurate and timely academic audits for graduation. All milestones for degree requirements must be monitored and approved by a responsible advisor or academic office. Coordination between departments is essential and would reduce the quantity of communications that flows between BCCC and the student in preparation for graduation.

- Deadlines should be enforced. There is no strict policy that prevents a faculty member from entering grades late thereby delaying end-of-term processing and graduation. Reports to determine which faculty is not complying should be generated and provided to the Deans for immediate resolution.
Pre-Enrollment Testing and Student Advising

Pre-enrollment Testing Process

- Timely updates of application information should be made available in COLLEGE and access should be authorized to those departments that need to verify application information. Immediate updates are fundamental to streamlining the application process.
- The test score upload process needs to be automated in order to reduce the built-in delay that prevents students from registering for courses in a timely manner; an automated process will also reduce the student’s need to carry a hard copy of his/her test scores. This enables faster and more effective student advising.
- Improve student utilization of online resources by making Blackboard based ACCUPLACER practice exams easier to use and by encouraging students to become comfortable with taking on-line tests prior to taking the exam. Limit the information distributed in hard-copy forms to a one page handout, thus eliminating the need for publishing the Student Guide. This action would be in accord with BCCC’s emphasis on going green.
- The appointment system needs to be integrated with other student systems to enable more efficient processes with the test center and to support better data integrity. Additionally, the use of a more automated appointment system allows students to have greater control over scheduling ACCUPLACER tests.
- Review testing center resources availability and provide solutions to ensure that there are adequate resources to meet demand during peak periods.
- An institutional directive needs to be created to support “live” ACCUPLACER Review Sessions. This service will greatly improve student ACCUPLACER scores and, in real-time, will guide students through the selection of appropriate courses.

Pre-enrollment Advising Process

- Review advisor resourcing, develop a resourcing plan to cover high volume periods, and limit the need to hire temporary advising staff to providing a more experienced, consistent level of advising. The Student Success Center is understaffed.
- Student Test Scores should be available real-time. Test scores are currently only uploaded into COLLEGE on Tuesdays. This process needs to be automated to streamline the process of registering for courses and to reduce the likelihood that a student will lose or misplace the hard copy of the test scores. In addition, the advising process will be more streamlined.
- The call center appointment system needs to be integrated so that the integrity of the student data is not compromised. Furthermore, an automated appointment system would
provide the ability for the student to schedule multiple appointments to include the ACCUPLACER testing, advising, examinations, etc.

**Academic Warning Process**

- The Student Success Center should have a more effective way to add notes regarding a student’s W1 status in COLLEGE. Additionally, the data that is shared at the Student Success Center and with the faculty should remain consistent and concise.
- Prior to general registration, the W1 report should be generated directly after the batch grading process. This results in students being notified of his/her D1 status, which will also direct him/her to meet with a Student Success Center advisor. This process would ensure that studies at BCCC continue at a level that is most appropriate for the student. Furthermore, the W1 report should be automatically generated without the need to submit a formal request to CITS.
- Student data should not be generated nor updated separately within each department. Updating multiple systems can challenge the integrity of the data. A fully automated system would allow for cross-departmental accuracy and consistency. Furthermore, the student would not be required to check with the Registration department for registration clearance.

**Academic Dismissal Process**

- Timely updates of academic information should be made available in COLLEGE and access should be authorized to those departments that need to verify and discuss academic information. Without timely updates, students could be in academic risk for future semesters.
- The Student Success Center should have the ability to register students. Once the Student Success Center obtains access to update the student’s academic information in SIMS, the Specialist will be able to counsel the student on his/her course schedule and subsequently enter the requisite notes and coursework information. This reduces the dependence on a student needing to maintain a hard copy of the course selections. This will enable faster, more effective student advising and subsequent registering.
- Improve student utilization of online resources by giving students the ability to register for Academic Workshops and other BCCC resources/support services. By providing online access to students, the student would have more control and flexibility with scheduling required workshops thereby making the process more streamlined.
- An appointment system needs to be integrated with other student systems to enable more efficient processes with the Academic Workshops and other support services.
Additionally, the use of an automated appointment system enables the student to have greater control over scheduling appointments.

- Review Academic resources availability and provide solutions to ensure that there are adequate resources to meet demand during peak periods.

Financial Aid

TITLE IV Grant Processing

- After reviewing the way Title IV aid is processed for students at Baltimore City Community College we conclude that BCCC is quite similar to other community colleges in the challenges it faces supporting students through the financial aid process. At BCCC the mechanics of the process are sound. The Financial Aid office looks forward to enhanced system processing with the implementation of the financial aid upgrade to FAM.

- We recommend that the College consider a review of the relationship between the expected enrollment indicated by students on the FAFSA and their ultimate registered hours. Because the College packages aid based on full-time enrollment and then adjusts to actual credits registered as the semester starts, students may have an expectation of a full-time award even when registered for less than a full-time load. Since roughly 66% of credit students are enrolled less than full-time, it is at least worth analysis to determine how many financial aid packages would have been amended if the FAFSA expected enrollment indications were used rather than packaging everyone at full-time.

- If it continues to make sense to package at full-time, then the ramifications and adjustments associated with dropping to less than full-time need to be clear and obvious. Some Community Colleges include on both their web site and in the printed materials accompanying the award a chart that specifically maps the adjusted award to the credits registered. This needs to be very visible to students and their families.

- The College should review its policy of disbursing aid 6 weeks into the semester. The trend is to move this time frame earlier into the semester, but there are certainly risks to doing so. If the disbursement date remains this late, the communications regarding it need to be clear to students.

- In general, the mechanics of the process are sound. But, the process mechanics are not what the student experiences. The students’ experience is shaped by the materials they are provided and the interactions they have with the financial aid and other professionals at BCCC. With this in mind we suggest that the key area for improvement in financial aid processing at BCCC is in its educational focus.

- The financial aid process is complex. That is a given. An important responsibility for any financial aid office is that of educator: educating students and families about how the
process works along with educating and mentoring them through the process. For students who have educational challenges, language barriers or simply a lack of experience with such complexities, financial aid professionals must fill this important educational role. The financial aid staff at BCCC is well intentioned. They are also, like all other financial aid professionals, challenged to work at a fast pace, make few errors and provide good customer service. These challenges are not unique to BCCC, so it is important for BCCC to learn from the experiences of other Community Colleges how to shape an environment that provides the desired service level, ensures compliance, and yet stays at a set staff size.

- To meet this challenge a goal should be to minimize the amount of personal counseling that is necessary. As noted above, space is limited. Many students need to have one on one support from the beginning of the application process onward. The College simply is not staffed for this level of service, so other avenues of providing support and counsel are essential.

- We suggest that BCCC focus its considerable knowledge of its service population by updating and in some cases retooling the materials it presents to its students and families with an eye toward their use as teaching tools. That means:
  - ensuring that the materials are error-free and updated for the appropriate time frames;
  - ensuring that the reading level of materials is appropriate the population being served;
  - delivering materials in multiple modalities;
  - delivering materials in multiple languages;
  - ensuring that the tone of messages is universally one of support and service; and,
  - validating the usability of financial aid produced materials through formalized usability testing.

*Error-free and Timely Content*

- Written materials are always necessary to support the financial aid application process. Students learn a great deal about the process -- its requirements, deadlines, and outcomes – from that material. As analysts, we reviewed much of the content available to students as a way of educating ourselves about the process at BCCC. We recommend the following steps be taken immediately, in collaboration with other areas of the College that can provide appropriate levels of support:

- Establish a process by which all public content is reviewed for accuracy. An example: the brochures that were distributed for the College’s February “Financial Aid Awareness” sessions displayed a prominent typo. These types of errors need to be avoided in order to ensure the viability and credibility of the message.
• Establish a process by which all public content that is time sensitive is set to expire or provide ticklers for update.

• Organize the links on the College’s financial aid page in a logical, sequential progression rather than alphabetically. For example, the “How to Apply” link is needed at the very top of the list. Once opened, the page currently is quite lengthy with relevant information. But, the key dates (as described in #4 below) are at the very bottom of the page. The March 1 and June 1 deadlines need to be prominent and broadly visible.

• Ensure key items of information, such as Important Dates and Deadlines are prominently displayed and up to date. Note that these dates are embedded in one of the Financial Aid pages, but they are at the bottom of a very long page and not easily found by a student. The College’s Title IV Code should be easy to find.

• Ensure that the information provided to students provide them with fully knowledge of the process and expectations. From the College’s web site we should be able to map the process of applying for financial aid from the way the information is presented. This was not possible due to the way the information is currently organized and presented.

Reading and Arithmetic Level

• A significant number of Community College students test into developmental reading, writing and math courses. Baltimore City Community College is no different. The materials provided to students should be at a writing level that is understood by most. We recommend enlisting the services of a developmental specialist to review the written materials – in print and on the web site – for their grade level and to make recommendations that make the content accessible to as many students as possible.

Multiple Modalities

• Students are provided information regarding the financial aid process via the College’s web site as well as through printed documents, participation in “College Goal Sunday”, high school workshops and through a number of “Financial Aid Awareness” sessions throughout a given aid year. This presents a reasonable combination of written and face to face content. However, many students are likely unable to attend face to face sessions due to their work or family schedules. Can this material be presented using technology?

• That question is similar to the one asked about online learning – can we provide a robust educational environment outside of the face to face classroom. We know the answer to be yes. So, what makes sense in terms of the educational mission associated with financial aid?

• Make effective use of email, portals, chat rooms and text messaging.
A frequent concern about College email messages is that students do not read them, particularly when they are sent to college-supplied email systems. That issue is outside of the scope of this recommendation. However, it is essential for the financial aid message to be delivered using interactive digital tools. One suggestion is to implement a Constituent Relationship Management (CRM) tool for financial aid. This type of tool enables an email to be sent to a targeted population, and then for that email to be tracked and followed up on. This is a common tool of marketers, and a rising best practice in enrollment. Targeting the message just to those who need to hear it is likely to get a better response – so the research tells us. How might that be used?

Suppose its February 15th. The deadline for FAFSA submission for students to receive Maryland state scholarships is March 1. A CRM tool could be configured to target the returning students who received financial aid last year and have not submitted a FAFSA this year (and who are also eligible for the Maryland state scholarship) and begin a campaign to message them until their FAFSA is complete. The tool does the work (after it’s configured) of knowing who needs the message and when to send it.

- Even without a CRM product, which can be quite inexpensive, email can be used effectively on its own to personalize timely communications to a student in an attractive and effective way.
- The current portal is adequate for what it provides, but a more robust portal would begin announcements about Financial Aid deadlines, financial aid tracking, and other key items in a personalized, contextualized way that is much more likely elicit a response than a bulk email.
- Many schools are setting up “office hours” in the form of scheduled chat rooms or instant message sessions. These have been found to be successful, especially when they are regularly scheduled and staffed, as a way of supporting students at off hours.
- Use the distance learning tools that are already in place. The College uses Blackboard as its course management system. Configuring a course into which all financial aid applicants or recipients are registered can be a very effective way of getting the word out or organizing information for enrolled students. The College has experienced course developers on its faculty who could be engaged to build a pedagogically sound and developmentally appropriate environment for learning about financial aid at BCCC.
- Implement 24 x 7 Interactive, Up to Date video solution.
- Many Colleges have implemented services such as Financial Aid TV (FATV) (http://www.financialaidtv.com/index-fatv.php) to provide audio/video content regarding federal financial aid, as well as local financial aid opportunities. Such a turnkey solution would provide access to appropriate materials in a format that students are used to. Even
more importantly, families of students can access this service to become familiar with the process as well. These types of tools have been found to be quite useful to first generation college students in informing their parents, who may have language or literacy issues, about the financial aid process and what they can expect. These materials can be purchased in English, and are also available in many other languages.

Multi-Language Support

- Not all BCCC students speak English as a first language. Since students will be attending classes in English, personal communications to them can, and should, remain in English. However, providing other sources of relevant documentation and information in other languages can make a difference in students’ understanding. Each delivery modality – email, text, web, and video – should have options for other languages. That does not mean translators need to be hired! Tools can be associated with the web site that can do on-demand translation. And, FATV can be purchased with options for other languages.

Tone of Service and Support

- In the materials provided to students and family a universal tone of service and support is necessary. It is easy, given the pressures of compliance and the challenges of working with students, to emphasize the student responsibilities. The context for those responsibilities should be an outgrowth of the service and support provided by the College. An example: the Financial Aid Information Pamphlet is provided to students upon receipt of a financial aid award. The information in that pamphlet is very important. The language is very focused on the responsibilities of the student, which are also appropriate. The tone could be modified to congratulate the student and provide the service information first. It is pointed out that the students’ responsibility is to seek out answers to questions if they have them. Pointing them in appropriate directions to find those answers could be helpful.

Usability Testing

- Any materials generated and distributed to students that they don’t understand or do not know how to use are useless to supporting the process. The fact that so many students do not respond to correspondence regarding verification, SAR C-flags or other important items is a real problem for the office. So, why not ask the students if they understand what they are getting and if they understand the consequences of action or inaction. As a last step – after materials have been retooled as suggested above – we recommend that usability testing by qualified professionals be conducted. Sometimes this comes in the form of a focus group with students, other times in a more formal process managed by
appropriate professionals. The important outcome is to ensure that as many students as possible understand all the materials presented, how to participate fully in the financial aid process, and, as a result, benefit from it by having a financial aid award.

Imaging of Financial Aid Documentation

- The Financial Aid staff is confident that the imaged document is readable and can be used by the counselor. Currently the office staff is retaining all paper copies of documents received (2-1/2 cabinets) and purging those documents after four years. This is taking up necessary and limited physical space. We recommend that the paper retention policy be reviewed and a plan developed and executed that eliminates the extra step of filing paper.
- The imaging software and Regent software are not integrated. This results in staff needing to manage two separate processes. We recommend making changes to the current system – with vendor support as needed – in order to index the imaged documents so the requirements are automatically satisfied. This will allow the financial aid office to see the true benefit of the imaging system.
- Incomplete applications are forwarded to counselors because it appears to be impossible to sort complete and incomplete applications before pushing them to the counselor. This prevents a level of automation that should be possible-and increases the work of the staff. Counselors should only need to focus on complete applications.
- Overall, the financial aid office in partnership with CITS and the vendors involved should work to configure the process so workflow is automated and paper retention is minimized. Reducing redundant processing will improve the awarding cycle and delivery of financial aid to the student.

Return of Title IV Funds Calculation

- The entire financial aid counseling staff should be trained on how to perform the Return of Title IV calculation and R2T4s should be divided by counselor case-load.
- The Financial Aid Office should work with colleagues from around the College to create a mini-task force that will help develop an institution-wide policy and procedure on how to collect withdrawal information. The best way to ensure compliance is to seek input from other offices.

Catalog/Schedule/Degree Audit

- Contracting with one graphics firm would eliminate or decrease manual, labor-intensive, and duplicative processes and would automatically validate and secure data that is being requested or processed. Additionally, providing a single, consistent source for updating
and designing the annual catalog gives students, faculty and staff greater control over curriculum information and allows for accurate and timely access and auditing for program/certificate planning. Consistent graphic resources would be a more cost effective solution. The alternative would be to hire an internal graphic designer to gain ownership and maintain consistency in published documents throughout the Institution.

- The Academic process for the catalog content needs stronger ownership and accountability. A production calendar that is aligned with the Academic Calendar should be developed and incorporated as a policy to plan, prepare and produce updated material for students, faculty and staff that is reliable, up-to-date and meaningful.

- The Publications department needs updated software and hardware. New technology would decrease the dependency on outside firms, allow for better data integrity and a more streamlined production of the Catalog Master. Collecting multiple files from multiple sources lends itself to data inconsistencies, mismatched content, and overall delays in submitting the final version for publication and distribution in a timely and coordinated manner.

- Coordinating and synthesizing input from multiple departments consistently delays the production of the Master Catalog and furthermore results in producing inaccurate information for students, faculty, staff and administration. A single source of information and a production calendar that is strictly enforced would benefit the entire Institutional community.

- This will enable records/registration staff and counselors/advisors to more proactively identify students who are nearing graduation.

- The dynamic requirements of BCCC cannot be met by the current system. The system must be flexible enough to handle course selection criteria. The system should facilitate academic advisement and exception handling.

- Not maintaining a current Degree Audit system will have a devastating impact on BCCC’s student population and on the many support offices that rely on an integrated, automatic system. By comparison, an updated and current Degree Audit system will radically improve student advisement and put the ability to outline and to plan for future semesters in the hands of the students and minimize staff resources that are currently overtaxed.

- Since there is no single office assigned to endorse the degree audit system, there will continue to be a potential for violation. There should be an Institutional policy to make the catalog as comprehensive and accurate as is practical to provide all information required for recruiting, admissions, advising, student life and activities, and as "the source" for curriculum and course information. The catalog and subsequent degree audit maintenance should be treated like a contract. With great care and time given to achieve
both, the catalog will become the reliable and authoritative source for BCCC students, faculty, staff and administration.

- Maintaining an up-to-date Degree Audit system will eliminate repetition of staff effort, save time/resources, and maximize both the consistency and accuracy of output. Currently, a significant portion of the student body is not being effectively served.

**Master Schedule Maintenance Process**

- The decentralized initiative provides the opportunity for individual departments to attain a greater level of independence. However, without an overall planning strategy that incorporates and enforces deadlines, the distributed commitment is challenged. While Academic Calendars are formed encircling student activities and schedules, a campus-wide Production schedule for the Master Schedule should be developed and aligned with the Academic Calendar. This would provide a mechanism for monitoring and tracking the progress of the Master Schedule and concurrently, enforce deadlines.
- The current Waitlist function within SIMS needs to be implemented as a course management tool. For it to be effective in terms of student enrollment and retention the end-user community should be aware of its long-term purpose and access to its functions should be made more readily available.
- Facilities should be given access to SIMS to input out of service rooms. Academic Departments are unaware of rooms that are not available due to renovations or malfunctions and may assign courses to those rooms. Thus, the Master Schedule will be incorrect and students will be misinformed.
- As BCCC’s going green initiative is progressing, based on the current distribution of the Master Schedule, a decrease in the printing of the Master Schedule Booklet to an appropriate level would align well with this new initiative while decreasing costs and resource efforts in producing hard copy versions. An on-line version should be communicated and would serve as a more current version to the academic population.

**BCED**

- A goal of the college should be to put as much information online as quickly as possible and to grant appropriate access to the information to individuals who need the information. Investigate the ability to have the multiple databases communicate or transfer data where possible. It might be necessary to create a front end application that will collect all the necessary data for all systems and then develop an extract/upload process so that all the databases are updated in a consistent manner. There is great risk in the use of multiple data systems and data entry points. Students may have multiple records within any given system because of inaccuracy or incomplete data. Corrections of
the basic personal information are difficult, time consuming and cumbersome. Additionally, prerequisites, especially those that have been completed at BCCC, should be readily available for review and validation by all staff that assist students in the registration process.

- The overarching improvement for this process is to move as quickly as possible to an online collection and data retention process that becomes the primary system of record for student demographic and registration data.

## Grants

- The Financial Aid auditing processes of the Critical Transaction Review and Title IV Reconciliation should be moved to either Accounting or the Internal Auditor as soon as possible.
- The Inventory Asset Tagging required by the State of Maryland should be moved to the Property Control as soon as possible.
- Institute electronic documents and imaging to reduce/eliminate the need for a completely separate physical copy of the file in the Grants & Contracts Office.
- Create a cross-functional administrative management team that develops policies and procedures that are cross functional and address the record keeping needs of the College and each unit involved. This team needs to be fully aware of the State requirements for data management as well as develop procedures that hold staff and divisions responsible and accountable for the records that they manage.
- Management in each division need to be clear on their areas of responsibility and stop staff from taking over processes to units where it is inappropriate.
- Review processes that have been established to address historic audit findings to determine if these processes are still valid. A good candidate for review is the Critical Transaction Review process.
- Grants & Contracts should not need to review transactions that have already been approved by them unless a significant change has taken place. This is particularly true during the procurement process.

## HR/Hiring

- A formal procedure and timeline should be established to eliminate this delay in securing the appropriate signature and requesting departments should take a much larger role in the responsibility for the timeliness of the paperwork so that pay delays that are within the college’s control can be minimized and preferably eliminated from both full time and contractual hires.
• Work with the State of Maryland to allow Payroll to enter contracts directly into the State 311 system instead of sending the paperwork to Annapolis for data entry. The Human Resource Office is already entering new hire paperwork into the State 310 system.
• Decommission the redundant !Trak-It system and train the HR Coordinator to do queries for reporting directly from the Personnel database, which is the de facto corporate database of record.

**Procurement**

• A comprehensive Procurement document should be developed that outlines each Procurement transaction type, the documentation necessary from the end user and the expected timelines that the request can reasonably be completed. Many schools publish this on their internal websites so end users and vendors understand the timeline of a process. For example, a small dollar transaction that cannot be completed on a CPC should be generated within 10 business days or less.
• The CPC should be deployed at an appropriately deep level within the organization. End user offices should have at least one CPC for general transactions with the $2,500 limit.
• A CPC for travel should be deployed deeply within the organization. The travel program managed by Procurement should be eliminated and handled by concerned departments. Final approvals should be sent to Procurement office for records. Training and guidelines need to be developed in order to appropriately deploy this program.
• Review of the CPC for asset purchases needs to take place. To require a purchase request for an asset under $500 is unnecessary, particular since most of the assets in this category are technology and should be reviewed and managed with CITS as well as asset management.
• FMIS functionality needs to be fully utilized. This includes:
  • Review and implementation of all appropriate financial authorizations and reviews for a transaction,
  • Utilization of the Notes screens in a consistent manner
  • Ongoing updates for requests in the system on a weekly basis – particularly for those transactions that may take several months due to external agency reviews
• The College is encouraged to investigate the State requirements for Procurement by State Agencies. Several Colleges, while not considered State Agencies, do follow the same procurement processes that BCCC does and can provide reasonable timelines for when requests will be generated. It appears that some of the policies and procedures at BCCC are more a matter of interpretation then of actual requirements by the State. This situation might be mitigated by a meeting with the various State Agencies, the Director of Procurement and the College President.
• End users expressed their frustration during interviews. The level of impact to the students is significant. When a student is using tools that are several years old (Nursing) or non-existent (BCED), the mission of the institution is not being met. While end users understand that there are guidelines that must be followed, end users believe that the BCCC Procurement Office should be an advocate for them and not a roadblock to serving the students.
• The following are some specifics that illustrate deficiencies in the Procurement process:
  • There is little/no communication of Procurement’s expectations of requirements for Procurement processes. End users often stated that procedures change unpredictably; some units seem to have more perceived latitude in the process than others. There is an overall feeling by them that Procurement does not want to be questioned about the processes.
  • The use of the Corporate Purchasing Card is inconsistent and not required by Procurement. The State of Maryland mandated the use of the CPC in 1997-1998 according to documents found on the state website. BCCC needs to move to this model as soon as possible. In addition, consideration should be given to deployment of the CPC for travel expenditures at the end user level and remove the travel arrangement responsibility from the Procurement Office entirely. The Procurement Office should only be responsible for the review and audit of CPC transactions – both for direct product/service purchases and those related to travel.

IT Support Model

• In reviewing the College’s IT support model practices, several areas surfaced where the need for focused action became apparent ranging from establishing long term methodology and strategic planning, to short term implementation of system integration, to immediate improvements in capturing metrics and providing management reporting.
• Overall, the lack of service support and service delivery metrics show an inability to effectively measure activity performed with the organization. Without strong service metrics it is difficult, if not impossible, to understand the resources required to effectively support the College. Service Level Agreements (SLA), a baseline for IT Support Model best practices, cannot be established nor can the organization’s ability to meet these SLA’s be measured. Effective delivery of service was also limited by the lack of prioritization taxonomy.
• Throughout the process reviews the need for short term and long term focus on Identity Management was apparent. From the use of social security numbers throughout processes and systems to the inability to track and restrict a user’s access privileges, the lack of best practices in identity and access management was apparent.
• While IT support procedures were in place, overall there were many gaps between the written procedures and the actual processes being followed. There was a noticeable lack in levels of supervision and leadership within IT. This, combined with minimal group meetings to set direction and review IT process areas, is a strong contributing factor to this gap.

• The inconsistency with regard to the acquisition, deployment, and tracking of technology throughout the College was reflected in multiple process reviews. Lifecycle planning was found to be very informal and undocumented. This was shown to be due in part to the cumbersome procurement process and its associated lack of clarity and the lack of verifiable asset tracking processes. Other contributing factors included a lack of Project Management, IT Governance, and long term planning for technology.

• Both new and older obsolete equipment was observed in hallways, conference rooms, data closets, offices and other storage areas. This was shown to be due to inadequate staging and storage areas as well as a lack of clear procedure for recycling or disposal of equipment.

• While the necessary changes may sound somewhat overwhelming, the ability to make quick and effective progress in closing gaps and improving efficiencies in the IT Support Model area is supported by a very strong CampusWorks Best Practice and depth of experience.
Chapter 6: Replace Outmoded Administrative Systems

Overview

The Colleges needs an integrated administrative system (IAS), often referred to as an enterprise resource planning system (ERP) that addresses the current shortcomings in the Student Information System at Baltimore City Community College (BCCC). While a typical IAS implementation would include a Student component, along with Finance and Human Resource components, BCCC’s status as a state agency requires that it use state systems for typical finance and human resource transactions. Investing in those two components is not necessary at BCCC.

A survey of the current IAS options available to BCCC is included in the Enterprise Resource Planning Statement of Work, RFP 3.5.4/3.5.6, September 1, 2008, recognizing that the procurement process will determine the solution best suited to the College.

Selection Considerations

The selection considerations should include:

- Functionality that supports all of typical student business process – recruiting, admission, financial aid, enrollment, registration, advising, billing, degree audit, catalog and schedule.
- Functionality that supports specialized requirements of non-credit students, including flexible registration and billing options.
- Functionality that supports the work force development mission of the community college, including the ability to process employer based transactions.
- Technical architecture that allows for APIs or interfaces between the college’s ancillary systems.

The new IAS should be defined as the sole authoritative source of student data and as such support an institutional implementation of Identity and Access Management, as described in Appendix C of this document.
System Components

Because ERPs do not include certain types of business processes, ancillary systems are likely necessary. Systems such as CollegeNet’s Resource 25 system are already in use at BCCC and will continue to be because of the specialized business processes it supports. Additional systems to be considered include:

- Academic Catalog Management System (ACMS) to provide a web-based catalog with information easily updated as program requirements change, and accessible to students and faculty as needed.
- Appointment Schedule to provide students with self-service options for scheduling testing, advising or faculty appointments.
- Early Alert System to allow for timely and early intervention with at risk students.
- Constituent Relationship Management (CRM) to provide for personalized communication to all constituents, targeted to meet their needs.

Integration Components

Recognizing that the student experience is paramount, the presentation of services to students, and the integration of the IAS and ancillary services from the student’s perspective occurs in a modern portal implementation. Personalized services and messaging, based on the student’s role, should provide windows into the various systems that students should access. Among them will be the student information system, for items such as class schedule, grades, bills and financial aid. Announcements, email, calendars and course management systems should all be presented in this way.

Institutional reporting – transactional, decision making and executive dashboards – are the key output of an IAS. Developing a best practice reporting infrastructure will support the integration of critical institutional data, and serve as a back end integrator.

The various systems must be integrated in order to best serve students and to provide for the necessary management information. Integration of service delivery to students, staff and faculty occurs in the portal. Reporting is supported by a best practice reporting infrastructure, developed as the implementation occurs and institutional business process are merged with ERP data management requirements.
Baltimore City Community College is about to embark upon a technology transformation process that will impact virtually every employee, student and friend of the college. One of the major elements of that transformation will be the implementation of a Student-centric integrated administrative system that will streamline data entry and access, enhance accuracy and security, and dramatically improve the ability of the college to serve its constituents. It will allow the creation of a single ‘system of record’ for student related information, reducing repetitive data entry and misinformation.

The next few years will result in a sea change in the way that Baltimore City Community College gathers, processes, and uses information to find and generate new sources of revenue, avoid unnecessary expense and improve services to students. The IAS implementation has the potential to significantly impact the way the community views the College and the services it provides. It may be the single most “profitable” investment the College will make for the next few years.
Chapter 7: Implement Document Imaging

Overview

The Electronic Document Management (Document Imaging) Statement of Work, RFP 3.5.5/3.5.6, September 1, 2009 provides the framework for an institution-wide document management system. It provides specific recommendations to the College about how to plan for, acquire, and implement a comprehensive electronic document management system.

System Benefits

Implementation of this system can:

- Enhance document management and security while facilitating compliance with retention policies and regulations,
- Improve access to information through the use of secure shared online document libraries,
- Reduce storage requirements and associated costs,
- Streamline workflow and business processes, resulting in greater efficiency of the administrative record keeping processes, and
- Improve service to College constituencies including students, faculty and staff.

The statement of work included a formal request for proposal, designed to the specific needs of the College, which can be used during the procurement process. The timing and staging of the procurement and implementation will depend, to some degree, upon the acquisition of a new student and course information system, currently in the planning stages.

Institutional Activities

Related activities that position the College well for undertaking this project include:
• **Archiving.** The College is currently in the process of scanning and electronically storing nearly 5 million archival documents which can be incorporated into the new system.

• **Pilot projects.** The College has implemented pilot projects for electronic document storage in the financial aid, purchasing and payroll departments. While these efforts are not integrated, they have introduced electronic document imaging and management concepts to the staff and have prepared the College for more sophisticated systems.

• **Business Process Analysis.** The recent business process review and analysis has identified numerous areas for process improvement, many of which can be supported by the use of electronic document management.

• **New ERP System.** The planned acquisition of new integrated student and course related systems can dovetail with the implementation of a document management system and propel the College toward a highly efficient service delivery model.

**Institutional Considerations**

The College faces challenges in these areas:

• **Uniformity.** The various offices currently using different imaging/scanning systems and equipment will need to be standardized on a single new document management system in order to provide the uniformity needed to effect efficiencies.

• **Culture.** Business process improvements will require modifications to many longstanding procedures, which will, in turn, change the way different operational
units interact. A new culture of cooperation will be required to leverage workflow improvements toward improved service levels for constituents.

- **Timing.** Precise planning and scheduling of a staged implementation that complements the implementation of the new ERP/Student information system will be critical to success of the project.

The innovative features and highly efficient benefits of a modern document management system will provide the College with a valuable tool that can be used throughout the institution. Features like electronic forms for student applications, online report access, automated document management and process workflow will revolutionize the way in which the constituents of the College interact with one another, process information and provide service.
Chapter 8: Priority Setting and Project Schedule

Determining Priorities

The process of setting priorities, given the quantity and complexity of the tasks identified in the Technology Assessment, needs to be clear and disciplined. The six main elements of the institutional transformation using technology are:

- Develop a Best Practice Technology Governance Model
- Reconfigure the CITS Office
- Implement a Best Practice Technology Support Model
- Review Key Business Processes
- Replace Outmoded Administrative Systems
- Implement Document Imaging

Each of these items has at its foundation providing to the College, with a focus on its academic mission and student service priorities, an environment that both supports the College in that mission and is transparent, predictable and reliable.

At a high level it would appear that acquiring and implementing the ERP should be the first priority and first set of action items in a plan. However, a key piece of the foundation upon which a successful ERP implementation lies is the network upon which it runs. That network is a cornerstone of a successful Information Technology Support Model as well. So, remediation of the network needs to be the top priority for tasks related to Systems and Infrastructure. Based on the information we have at this time, remediation appears to be a large task as the current equipment is old, without maintenance and off warranty.

Addressing problems with data security cannot wait for a new ERP implementation, but must be addressed immediately given the severity of the risks involved. This means working within and potentially modifying the current Regent-based Student Information System. While some might say “Why are we correcting the system we are no longer going to use?” the risks to the institution of inaction are too great to put off.
As important as these types of decisions, the leadership, management and organization of the staff who support technology at BCCC – the CITS staff – needs to be addressed. Staff need to be reorganized as part of the implementation of a best practice support model, need to have performance standards developed and professional development plans formalized. Perhaps the greatest need within the CITS area is the need for the job reclassification that has been pending for some time. That job classification needs to look at the organization for today – in light of the support model and staffing described previously in this document – and also prepare the way for the type of change that will be essential as new systems, technologies and governance are brought on line.

An important role of the governance process is to support planning for the future while the technology staff are caring for current problems. As suggested in several places in this document, network remediation is one of the important projects that must be accomplished to prepare the College for the implementation of a new ERP. The governance group can take the lead on the evaluation and selection of a system while the technology staff are completing the essential preparations. That collaboration will help to move projects along at a faster pace, while involving and educating the community in these important decisions and projects.

Schedule Considerations

Many factors will influence the project schedule. However, the timelines presented on the following pages meet the objectives of remediation as outlined in the Technology Assessment and align with the objectives for transformation as discussed in this document. It is important that resources are expended in such a way as to leverage the effort.

The schedule lays out tasks with an emphasis on remediating items that put the institution or technology services at risk. Primary among those tasks is data security – particularly the need to remove the institutional vulnerabilities caused by the use of Social Security Numbers. Network remediation, and associated tasks, must be performed before new, network intensive services are added. And institutional technology governance must be in place to support the expected changes and challenges. Parallel to these activities must be a reorganization of CITS, along with the ground work effort to move to a best practice technology support model.
The following pages integrate the items identified in this document with those identified in the technology assessment into a proposed project schedule for meeting the identified goals.
## CampusWorks' IT Tactical Technology Plan for Baltimore City Community College

### Summary

#### Projected Schedule

September 2009 - August 2014

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<th>Year 1</th>
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### IT Management and CITS Organization

- Reorganize CITS
- Tactical Leadership & Technical Operations Mgmt
- Enterprise IT Planning and Alignment

### IT Transformation Office

- Establish IT Governance Structure
- Establish virtual Project Management Office
- Implement Best Practice Support Model
- Facilitate Process Improvements (existing systems)

### Web Presence (Portal)

- Remediate existing technical problems

### Administrative Systems

- Remediate existing systems
- Systems Integration (current systems)
- System Usage Improvements (current environment)
- New Student/Course Information System (ERP)
- Conduct ERP/Student Acquisition
- Implement Student(ERP) system

### Document Management - Imaging and Workflow

- Conduct DMS Acquisition
- Implement DMS-imaging

### Systems and Network Infrastructure

- Network Improvements/Remediation
- Equipment Life Cycle Management
- Communications

### Digital Convergence (data, voice, video)

- Digital Convergence (data, voice, video)
  - Network Enhancements to support data, voice and video

### Instructional Computing

- Remediate Access barriers
- Standardize/upgrade classroom facilities

### Security Efforts

- Remediate existing vulnerabilities, particularly with SSNs
- Develop/implement business continuity plan
custom data security task force and ensure compliance with PCI, FTC Red Flag, FISMA and SSH

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[Confidential Page 58]
## CampusWorks' IT Tactical Technology Plan
for Baltimore City Community College

**Detail**

**Projected Schedule**
September 2009 - August 2014

### Year 1 - Sept 2009 - Aug 2010
### Year 2 - Sept 2010 - Aug 2011
### Year 3 - Sept 2011 - Aug 2012
### Year 4 - Sept 2012 - Aug 2013
### Year 5 - Sept 2013 - Aug 2014

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<td>Initiate staff mentoring/development</td>
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<td>Enterprise IT Planning and Alignment</td>
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### CampusWorks' IT Tactical Technology Plan for Baltimore City Community College

#### Projected Schedule

**September 2009 - August 2014**

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### IT Transformation Office

- Establish IT Governance Structure
  - Create collaborative environment/framework
  - Organize Administrative systems user group
  - IT Governance Planning and Implementation
  - IT Communications Planning and Implementation
  - Establish IT procedures/standards to be ITIL compatible

- Establish virtual Project Management Office
  - Create Portfolio of projects
  - Establish priorities for all projects

### Implement Best Practice Support Model

- Life Cycle Replacement Plan and Implementation
- Standardization Plan and Implementation
- Infrastructure Plan and Implementation
- Desktop Computer Plan and Implementation
- Software Plan, including Imaging Standards
- Classroom Technologies
- Staffing
- 24x7 Support
- Help Desk Software and Knowledgebase Development
- Identity Management Plan and Implementation
- Establish consolidated contact/dispatch center

### Facilitate Process Improvements (existing systems)

- Identify/resolve State/Local system security & interfaces
- Refine admission, testing, and enrollment processes
- Support BPR recommendations and promote local refinements
- Investigate/Implement student self-scheduling for tests/advising...
- Implement procurement recommendations
- Review refine BCED access policies for Library and technology
- Refine and distribute acceptable use to all constituents
### CampusWorks' IT Tactical Technology Plan
for Baltimore City Community College

### Projected Schedule
September 2009 - August 2014

**Detail**

|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|

#### Web Presence (Portal)

- **Develop BCCC standards for web page layout and usage**
- **Implement usability test process, style guides for web**
- **Remediate existing technical problems**
  - Amend Faculty portal for focused display
  - Ensure student identity information not revealed via portal
  - Develop BCCC standards for web page layout and usage
  - Conduct usability testing and incorporate into process
  - Provide System & Dept training on Web content mgt
  - Establish Web presence governance team
- **Implement Portal based delivery to all constituents**
# CampusWorks' IT Tactical Technology Plan for Baltimore City Community College

## Projected Schedule

**September 2009 - August 2014**

<table>
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<td>Year 5 - Sep 2013 - Aug 2014</td>
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## Administrative Systems
- Remediate existing systems
- Develop consolidated data flow documentation
- Access management plan and implementation
- Ensure timely interfaces and system availability

## Systems Integration (current systems)
- Implement timely Accuplacer updates
- Implement SIS-Lenel interface
- Implement enrollment best practice integration

## System Usage Improvements (current environment)
- Implement BPR recommendations for Trak-IT
- Remediate Degree Audit Configuration
- Streamline enrollment back-office processes
- Review billing process
- Financial aid disbursement timing
- Determine Regent limitations and remediate
- Tune Drop-Nonpayment Process
- Implement Student Self service scheduling solutions
- Implement tracking and early alert solutions
- Expand Schedule25 use for classes, events
- Refine Blackbaud/Raiser’s Edge training and usage

## New Student/Course Information System (ERP)
- Determine/refine requirements

## Conduct ERP/Student Acquisition
- Release RFP against requirements
- Evaluate bids
- Select vendor
- Perform fit/gap analysis
- Develop implementation plan
- Develop maintenance and upgrade model
- User training

## Implement Student(ERP) system
- Implement core student system
- Integrate with revised process improvements/workflow/DMS
- Develop Integrated Reporting Datamart
- Implement Sharepoint site for standardized reports
- Implement portal based services
- Ongoing implementation of product enhancements
## CampusWorks' IT Tactical Technology Plan for Baltimore City Community College

### Projected Schedule

**Detail September 2009 - August 2014**

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<td>Document Management - Imaging and Workflow</td>
<td>Conduct DMS Acquisition</td>
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<td>Release RFP against requirements</td>
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<td>Evaluate bids</td>
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<td>Select vendor</td>
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<tr>
<td>Perform fit/gap analysis</td>
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<td>Develop implementation plan</td>
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<td>Develop a life-cycle plan for product</td>
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<td>User training</td>
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<td>Implement DMS-Imaging</td>
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<td>Administrative Center/Pilots</td>
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<tr>
<td>Implement product enhancements</td>
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Confidential
# CampusWorks' IT Tactical Technology Plan
for Baltimore City Community College

## Projected Schedule
September 2009 - August 2014

### Detail

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<td>Network Improvements/Remediation</td>
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<td>Implement data center migration plan to Liberty Campus</td>
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<td>Implement performance monitoring</td>
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<td>Conduct detailed analysis/inventory</td>
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<td>Remediate critical vulnerabilities</td>
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<td>Refine server utilization to provide redundancy &amp; improvements</td>
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<td>Develop and test business continuity plan</td>
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<td>Equipment Life Cycle Management</td>
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<td>Reconcile Asset mgmt/CITS process management</td>
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<td>Determine equipment inventory</td>
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<td>Assess life expectancies of various existing equipment</td>
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<td>Determine adequacy of existing equipment to meet requirements</td>
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<td>Develop and implement a hardware consolidation plan</td>
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<td>Determine plan for equipment replacement &amp; disposal</td>
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<td>Align equipment budgets with College’s budgets</td>
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<td>Communications</td>
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<td>Evaluate and prepare recommendation regarding existing phone system.</td>
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<td>Remediate/replace phone system, (VOIP?)</td>
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### CampusWorks' IT Tactical Technology Plan

#### for Baltimore City Community College

**Projected Schedule**

**Detail**

September 2009 - August 2014

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### Digital Convergence (data, voice, video)

- Network Enhancements to support data, voice and video
- Remediate cabling as needed
- Determine future voice requirements
- Determine future video requirements
- Develop plan for converged network
- Implement new designs in phases

Confidential
### Instructional Computing

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<td><strong>Remediate Access barriers</strong></td>
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<td>Implement enhanced RPC connectivity</td>
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<td><strong>Standardize/upgrade classroom facilities</strong></td>
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<td>Expand Streaming video as appropriate</td>
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<td>Review and refine provisioning policies for adjunct faculty and others</td>
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<td>Develop standard classroom configuration</td>
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<td>Improve classroom access and performance</td>
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## CampusWorks' IT Tactical Technology Plan
for Baltimore City Community College

### Projected Schedule
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### Security Efforts
- Remediate existing vulnerabilities, particularly with SSNs
- Secure vital Institutional Information (email related)
- Address Personal ID issues in Advising
- Evaluate/Implement wireless session authentication
- Implement Password/Pin reset functionality
- Network, Server and Support systems Document and Test/validate periodically
- Establish Data Security Task Force and ensure compliance with PCI, FTC Red Flag, PI and SSN
- Identify and plan for compliance requirements
- Assess cyber security on shared computers
- Identify PI vulnerabilities, paper and digital
- Develop an identity management plan & remediate current

### Other
- Plan and implement move from "N" drive to Sharepoint
- Implement Outlook Anywhere for faculty and staff
Appendix A: Technology Assessment Summary of Findings

Administrative System Recommended actions:

- Develop a comprehensive data flow document that identifies the current data dependencies among administrative systems.

- Identify and document the systems of record for key entities of the college (students, employees, buildings, rooms, courses and sections). Where necessary, resolve situations where an entity resides in two systems – such as a student having records in both the College and CERTS systems.

- Clarify and document all points of system interfaces and integration.

- Amend the faculty portal to provide access only to students currently enrolled in a faculty member’s course or currently assigned as an advisee.

- Ensure that a student’s personally identifiable information, such as birth dates and social security numbers, are not revealed via the portal.

- Organize an administrative user group to address systems and usage issues that impact all system users. Make this part of a formalized technology governance structure.

- Work with Regent to review the list of perceived system limitations and determine which ones are true system limitations and which are specific to the local implementation. Document those limitations and correct those that are implementation related.

- Investigate systems that are used for tracking and scheduling at other Community Colleges and implement one system. An example might be the SARS Grid product.
• Consolidate the information that staff, faculty and students need in order to receive help for systems, facilities, publications request and other internal support activities through a dispatch/contact center and plan for such service delivery through a robust portal environment.

Financial Aid Recommended actions:
• Review financial aid business practices.¹
• Review financial aid implementation to ensure a high level of service to students and families

Admissions Recommended actions:
• Complete a business process review of the admissions application process.²
• Identify and remediate problems that can be addressed within Regent.
• Review Call Center technologies and Call Center staffing models.
• Plan for and implement changes that will allow best practice system integration in the enrollment area.

Registration Recommended actions:
• Complete a business process review in this area.³

¹ Several financial aid processes were reviewed during the Business Process Review phase of this project. Based on information collected during the assessment phases these processes included: Communication, Title IV Grant Processing, Imaging of Financial Aid documentation, and Return to Title IV Calculations. Those results can be found in the Business Process Review document.

² Several admission processes were reviewed during the Business Process Review phase of this project. Based on information collected during the assessment phases these processes included: Early Enrollment Admission process, New Student Admission process (Traditional), New Student Admission process (International) and Transcript Evaluation. Those results can be found in the Business Process Review document.

³ Several registration, testing and advising processes were reviewed during the Business Process Review phase of this project. Based on information collected during the assessment phases these processes included: Student Registration Process, Veterans Registration Process, Student Information Changes, Transcript Request Process, Graduation Application Process, Pre-Enrollment Testing and Advising, Early Alert Intervention System, Academic Warning Process, Academic Dismissal Process. Those results can be found in the Business Process Review document.
• Identify ownership of key data points – such as addresses – and ensure proper data maintenance.

• Provide self-service password and PIN reset functionality.

• Bring the degree audit system up to date with program requirements.

**Student Accounts Recommended actions:**

• Conduct a comprehensive business process review\(^4\)

• Review the drop for non-payment process for its timing, reliance on correct data and overall impact on enrollment.

• Explore options to integrate financial aid with the student bill, as a student service and enrollment strategy.

• Verify that systems limitations are, in fact, systems limitations and not implementation limitations.

• Now that the College’s registration activity and financial aid activities have been analyzed through a business process review, the College should continue the effort by conducting a Business Process Review in this area.

**Placement Testing Recommended actions:**

• Implement an off-the-shelf scheduling package that will allow students to self-schedule testing and other appointments. SARS Grid is the type of application to be considered.

---

\(^4\) The Student Accounts area was not included in the Business Process Reviews conducted by CampusWorks. We encourage the College to complete this work as part of the preparation for a new enterprise resource planning system and as part of its efforts to improve student services.
• Ensure that the needs of this area for software and equipment upgrades are met in a timely fashion.

• Incorporate the testing area into the IT support model, reviewing needs on a regular basis.

**Advising Recommended actions:**

• Complete a business process review of the registration and advising process.\(^5\)

• Address issues associated with personally identifiable information, particularly the ubiquitous and problematic use of Social Security Numbers.

• Provide training to this office so they maintain their web-based content.

• Review the specifications and data requirements for the advising tracking system.

• Address system and data security concerns.

• Review and address reporting requirements.

**Human Resources Recommended actions:**

• Complete a comprehensive business process review.\(^6\)

• Determine the appropriate support model for !Trak-It.

• Complete an analysis of systems dependent upon HR data sources and implement work flow and office procedures that recognize those dependencies..

• Implement a document imaging solution.

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\(^5\) Several registration and advising processes were reviewed during the Business Process Review phase of this project. Those results can be found in the Business Process Review document.

\(^6\) Several human resource processes were reviewed during the Business Process Review phase of this project. Based on information collected during the assessment phases these processes included: Full-time PIN and Transfer Employee Hire, Benefits Enrollment, Contractual/Adjunct Employee Hire to Pay. Those results can be found in the Business Process Review document.
• Implement a best practice Human Resources systems solution.

Payroll Recommended actions:
• Determine if the FMIS system can manage the information for other employee types, potentially minimizing local data entry.
• Identify areas for data integration, if any.
• Improve the connection between hiring and paying people.
• Resolve issues associated with grant funded allocations

Procurement Recommended actions:
• Complete a comprehensive business process review in this area.7
• Identify the source of purchasing issues in the technology and nursing areas – two areas that require specific product requirements and report delays in purchasing and receipt of incorrect items that do not meet requirements.

Budget and Grants Management Recommended actions:
• Complete a comprehensive business process review of grant financial management.8
• Reconcile institutional, grant and State requirements.
• Ameliorate the paper processing and increase support for grant oversight.

7 Several procurement processes were reviewed during the Business Process Review phase of this project. Based on information collected during the assessment phases these processes included: Initial Requisition Process, Corporate Purchasing Card, Procuring IT Equipment, Process for Purchases over $25,000, Sole Source for Purchases over $25,000, IT Software Purchase over $25,000, IT Software and Hardware Purchases over $25,000, and IT Professional Consulting and Technical Services over $25,000. Those results can be found in the Business Process Review document.

8 Several grants processes were reviewed during the Business Process Review phase of this project. Based on information collected during the assessment phases these processes included: Confirmation of Award, Grant Closeout, Payroll Review, Monthly Reconciliation, Invoicing of Grantor, Financial Aid Critical Transaction Review, Financial Aid and Title IV Reconciliation, and Grant Inventory Tracking. Those results can be found in the Business Process Review document.
Facilities Scheduling Recommended actions:
- Leverage the College’s investment in Schedule 25, the premier College scheduling system.
- Determine system of record for buildings and rooms.
- Develop a comprehensive scheduling environment by including events scheduling in the Schedule 25 implementation.

Property Control and Asset Management Recommended actions:
- Address technology equipment disposal, particularly in areas where a significant amount of College real estate is occupied by unusable equipment.
- Clarify the relationship between Asset Management and CITS as it relates to life cycle tracking of all appropriate technology equipment.
- Clarify the receiving process in order ensure that the genesis of an asset management requirement is properly entered.
- Establish a moves management process that includes all responsible parties.
- Implement an events management system through Schedule 25 that allows all event requirements to be documented and scheduled in all affected areas.
- Complete the implementation of SchoolDude.

Public Safety Recommended actions:
- Build an interface between Regent to Lenel to support creation of student IDs.
- Encourage collaboration and consultation between these two important College service areas.
College Advancement / Foundation Recommended actions:

- Continued professional development and training in the best practice use of the Blackbaud products within the College Advancement office.

- Define the categories of students to roll to Raiser’s Edge and implement that roll process, beginning with recently graduated students.

BCED Student Access to Technology Services Recommended actions:

- Complete a comprehensive business process review, focused on the learner and employer experience.9

- Address concerns at RPC related to network performance.

- Address concerns at RPC related to system performance

- Review polices associated with BCED student access to services, including library and technology, and amend as necessary.

Web Presence Recommended actions:

- Develop a standardized training model for College staff to maintain their web content.

- Develop standards for web pages and layout that are used uniformly across the institution.

- Create a style guide that can be followed by end users.

- Complete a usability study.

- Implement a usability process.

---

9 Several BCED processes were reviewed during the Business Process Review phase of this project. Based on information collected during the assessment phases these processes included: GED Basic Skills, Pre-GED Testing and Registration; Community Education Services – Licensure and Certification; Registration for Open Enrollment, English Language Institute (ELI); Registration for Customized Training; and, Registration Data Entry Process. Those results can be found in the Business Process Review document.
• Form a web presence governance team – made of representatives from around the College – whose job it is to understand the web site’s purpose and components as well as establish priorities and develop usability standards.

• Complete a comprehensive business process review of the content management process.10

**Microsoft Exchange Recommended actions:**

• Examine and remediate system disruptions.

• Develop an up to date business continuity plan for email.

• Implement Outlook Anywhere, in order to make full email services available from on and off campus.

• Review policies for account provisioning, particularly for adjunct faculty.

**Sharepoint Recommended actions:**

• Transition, with an appropriate plan and process, the “N” Drive to Sharepoint.

• Develop and share a plan to support the use of Sharepoint as a best practice collaboration site.

• Implement Outlook Anywhere for faculty and staff in order to provide a richly featured environment for email and calendaring, whether on the College network or off.

**Institutional Research Recommended actions:**

• In conjunction with the rollout of a new ERP develop a best practice data mart and reporting model.

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10 This recommendation was not apparent during the data collection phase of this process. We recommend this effort be completed prior to any significant decisions regarding software or other web maintenance process.
• Provide a Sharepoint site for key decision makers to provide an archive of the output of standard reports. These include, but are not limited to, the periodic enrollment reports, MHEC submissions and IPEDS reports. Any reports that are regularly run and distributed through email should be posted to a Sharepoint site, in addition to or in lieu of email.

**Instructional and Academic Technology Recommended actions:**

• Complete a system inventory of all classroom technology.

• Ensure that all data/video projectors are working, properly situated in classrooms, and projecting quality images.

• Remove chalk boards from classrooms where computer technology is used.

• Complete a wire management assessment of classrooms, and ensure cables and connections are properly managed and reliable.

• Ensure that computers in classrooms are properly configured and secured.

• Institute a process by which faculty can report and track problems with projectors – such as those that display “clean filter” or other problems.

• Phones are not available in most classrooms. When technology needed to teach is not working, faculty need a mechanism by which to report this problem, which should be considered “production critical”.

• Analyze the implementation of zoned-lighting in technology equipped classrooms.

• Improve the DVD playback capability in classrooms. This may entail upgrading the older computer systems that are placed in numerous classrooms. Or, provided DVD/VHS combination players.
• Review the sizes of projector screens and ensure they are properly sized for the type of projection in use.

• Implement KVM switches in all technology enabled classrooms. This is an inexpensive option for allowing laptops to be plugged in to classroom technology and reduces some of the wear and tear on the PC cables and connections.

• Add job aids to all technology enhanced classrooms that provide instructions about how to use the technology. Given the heterogeneity of the configurations, these will need to be room specifics.

• Ensure that appropriate controls are in place so that equipment can be easily accessed and turned on or off.

• Place all classroom technology on a standard and well-communicated technology life cycle replacement schedule.

• Improve the aesthetics of classrooms – including removing outdated equipment.

• Consider enhancing the relationship between the physical classroom and the virtual classroom by providing tools to record and annotate lectures, such as Tegrity.

• Improve the reliability of the College’s email system.

• Improve the network connectivity in classrooms.

• Address responsiveness issues with the Blackboard implementation, particularly for faculty accessing while on campus.

• Analyze and fix the problems with student accounts and work being lost in Blackboard as a result of certain administrative actions.
• Analyze and resolve the issues associated with adjunct faculty access to email and Blackboard, including the fact that adjunct faculty accounts are disabled between semesters.

• Analyze and resolve the issues associated with faculty merging multiple sections into one in Blackboard.

• Implement SSL protection on the Blackboard connection.

• Reduce the number of Administrative accounts in Blackboard.

• Improve the visibility of the College’s distance learning office.

• Expand the resources available to the faculty by adding an instructional designer, or otherwise expanding the distance learning staff.

• Review the policies that require distance learning students to be on campus.

Expand online administrative services and provide for an online student orientation.

• Continue to use SmartThinking, and consider its expanded use given the success rate of student who use SmartThinking. SmartThinking is well integrated into the Blackboard environment and now familiar faculty. Its use can be expected to grow.

• Extend the services available via the Blackboard Community System.

• Explore the use of Web conferencing, rich media streaming, video conferencing, in conjunction with the interest in these services College-wide and via the College’s web site.

• Enhance the externally facing information about the Distance Learning presence on the College’s web site.
Network and Systems Infrastructure Recommended actions:

- Document current hardware/software and network environments. A current understanding of wiring, switch and server configuration is essential to any remediation plan.

- Implement network monitoring and performance statistics reporting.

- Focus on Core network and communications between campuses.
  - Evaluate the current hardware/software maintenance status and get contracts in place as needed.
  - Replace selected core components.
    - Implement redundant rack mounted components.
    - Document, test and remediate Fiber network.
    - Deploy centralized firewall services module.
    - Deploy limited distribution layer at key Fiber locations.

- Seek private Class C space to provide vendor independence.

- Implement Wireless session authentication for greater security.

- Develop a realistic data center migration plan to Liberty Campus, to include a review of the power and cooling systems required.

- Deploy environmental sensors in all equipment areas.

- Review and document power and cooling facilities and remediate.

- Develop a disaster recovery/business continuity strategy around a tiered services strategy, for communications, administrative services, and academic systems.

- Implement equipment renewal and disposal policies for all desktop and classroom facilities.
• Conduct a detailed evaluation of the phone system, with specific focus on the architectural impact of VOIP.

• Assess the current status and utilization of servers to optimize and provide redundancy.

• CITS and the Facilities departments must collaborate on the use of an integrated Facilities Management system.

• Ensure appropriate staffing and professional development for network and phone system technicians, as well as network and server administrators.

Data Security Recommended actions:
• Apply a best practice approach to information access at BCCC. All Colleges that provide internet access face the same challenges. Connect with colleagues at other colleges to understand their approach and, as part of the implementation effort of a comprehensive tactical technology plan, balance the needs of the academy with the responsibilities for network security.

• Reconsider policies blocking streaming media and other content.

• Provide secure and effective remote access to College services. Of particular importance here is email access. OWA is implemented, but is limited in ways that Outlook Anywhere can support. The current release level of the Exchange environment suggests this would be a relatively easy change to make that would have immediate and positive impact on the remote use community.

• Analyze and remediate the student identification component of the COCO system to align with best practice.
• Establish a PCI compliance task force comprised of technology staff and decision-making staff from offices that process credit card transactions. This group should produce a response to the current PCI Self-Assessment Questionnaire appropriate to the level of merchant status at BCCC. Review and remediate gaps with the support of an appropriate certified information security specialist (CISSP).

• Fully document IT staff responsibilities associated with a best practice security model.

**Disaster Recovery and Business Continuity**

**Recommended actions:**

• Bring all aspects of this document up to date.

• Ensure that all personnel involved are adequately informed and trained to perform the procedures outlined in this document.

• Ensure the up-to-date version of this document is part of the College’s emergency preparedness documentation.

• Ensure that a test plan is developed and executed that validates the plan.

**Policies and Procedures**

**Recommended actions:**

• Develop an easy to access and easy to understand repository of CITS policies and procedures, segregating those that are internal to CITS from those that are external and require compliance by offices and other constituents for CITS services.

• Architect a SharePoint site specific to technology and technology policies, along with other frequently asked questions and important updates to fill the clear need for an accessible Knowledgebase.

• Ensure acceptable use policies are distributed at time of account creation and accessible as needed by all constituents.
• Ensure that procedures for account creation, deletion and modification, are clear to all affected users, always mindful of the benefit that a best practice Identity Management System can support. Provide a mechanism for auditing this practice.

**Current Technology Plans Recommended actions:**

• Create a local technology plan, derived from the IT Master Plan required by the State, which aligns with BCCC goals and expectations.

• Develop metrics for success.

• Share this plan through the governance process, with specific attention to the faculty technology governance.

**Technology Staffing Analysis Recommended actions:**

• Reorganize the department consistent with a Best Practice Support Model for information management in higher education such as the one outlined in Appendix A of this document.

• Interject experienced higher education technology managers who can lead and/or mentor existing CITS management and staff.

• Perform a job reclassification effort in the IT department. The objective of this effort would be to ensure that job descriptions are appropriate and up to date and that salaries for positions are sufficiently competitive to attract and retain talented staff.

• Establish management practices within the CITS organization that will promote accountability and communication. Regular team and departmental staff meetings, status reporting, measurements and metrics that allow management to objectively assess the performance of the individuals, teams and department are essential.
• Redefine the current effort to develop a procedures manual to one that encompasses a comprehensive ITIL standards and procedures framework, including a systems development life cycle for current and anticipated applications and projects.

• Complete an inventory or profile of all administrative and academic computer applications that will serve to identify and document data flow into and out of each application area, define functions, products and processes for each. This will serve as the framework for a complete applications portfolio, allowing an objective assessment of relevance for integration with future systems.

• Create an integrated training and personal development plan for each individual based upon their current and potential roles within the organization. Consider including some of the contract personnel (20% of the CITS staff are contract personnel) within this plan if College procedures provide for it.

• Investigate the ability of the current system (HelpStar) to provide meaningful performance measurements for different categories of work assignments and configure accordingly, or replace it with a system that will provide this.

• Redouble efforts to record and measure all work assignments using the selected Help Desk tools, eliminating the practice of providing undocumented service.

• Establish benchmarks for performance that can be measured to determine how the support model is performing.

• Consistent with the tracking of daily work assignments, establish a mechanism by which work priorities can be assigned which are reflective of the institutional priorities. This will necessitate the creation and management of a governance structure and a “project portfolio” which addresses units of work that are beyond the
simple help desk or desktop solution. The assignment of priorities for these projects will be made by the governance organization that is addressed as a Best Practice for IT Governance and documented elsewhere in our report.

**Framework for technology transformation Recommended actions:**

- Develop a Best Practice Technology Governance Model
- Reconfigure the CITS Office
- Implement a Best Practice Technology Support Model
- Review Key Business Processes
- Replace Outmoded Administrative Systems
- Implement Document Imaging
Appendix B: Support Model Best Practice

The Technology Support Model in Higher Education
Model for a Best Practice

I. Introduction

The tremendous growth and proliferation of technology in institutions of higher education has placed unprecedented demands on technology organizations. Much of the technology in common use: desktop computers, laptops, projectors, printers, wireless technology, and others, are available at commodity prices. Institutions see technology as a pathway to becoming and remaining competitive. Faculty require a variety of technology resources to enhance teaching and learning outcomes. Students use technology to enhance the learning experience and to assimilate marketable skills for the workplace. Technology is used to build and maintain long relationships with alumni. Institutions use technology as a marketing tool and resource to business partners and community groups. Technology is at the heart of distance education and workforce development efforts.

All of these business drivers, and more, define the need for robust and well supported technology. The challenge for institutions of higher education is to construct a robust, effective and affordable support model for technology. Without an effective support model, the investment in technology will not be fully leveraged. An ineffective support model will result in faculty abandoning technology altogether. An ineffective technology support model will inevitably drive an institution into a diminished competitive position in the higher education marketplace.

This document describes a Best Practice Technology Support Model. The architecture, methodology, and strategies described in this document are used by CampusWorks Inc. (CWI) to enable our higher education client institutions to fully leverage technology. The CampusWorks support model starts from a holistic approach, recognizing that many components make up an effective and affordable support model. Accordingly, CampusWorks encourages institutions to focus institutional resources on core competencies and to form strategic outsource alliances.

CampusWorks Inc., with corporate headquarters in Sarasota, Florida, is a privately held and award-winning firm, established in 1999 as an information technology project management firm specializing exclusively in higher education. CWI’s IT project management and ERP specialists have accumulated substantial IT experiences (over 1000 person-years) from working in (and for) higher education over the past twenty-five years.

CampusWorks serves community college clients who recognize that they must migrate from current technology to a more robust, reliable, and more secure level of technology use. These clients engage CampusWorks to plan and manage the technology migration projects in order to sustain college growth, to avoid risk, and to offer improved service to students and faculty. Improved services include providing alternative teaching delivery methods enhanced by technology and better access to college services using more reliable and secure technology.
CampusWorks provides expert help to assist colleges/districts in making good choices to spend scarce budget wisely.

The CampusWorks management and technical staff cadre have well-established reputations and are deemed authorities among their colleagues. These practitioners serve CWI clients by sharing their valuable expertise gained through affiliation or contract assignments (with CWI or other companies) with over 250 higher education institutions and associations throughout the country.

Based on a proven success formula, CWI has earned the reputation among community colleges as a provider of premier IT leadership services. The experience and high-caliber of CWI’s Senior IT Executives and functional and technical staff – attested to by the satisfaction of our clients – is the cornerstone of this reputation. The work performed by the CampusWorks staff has led to outstanding commendations from community colleges and districts throughout North America.
II. Architecture of the Best Practice Support Model

The figure below contains a pictorial representation of a best practice support model in a typical college or university. The figure also captures the broad constituencies that the support model must serve. This best practice model organizes the collection of technologies, service deliveries, and technical support into a support structure with a seamless ‘front door’. That front door is the Help Desk, represented by the boundary around the support model. The Help Desk includes institutional professionals, virtual resources, and outsourced business partners. In the next section, we define each of the components of the support model in more detail.

Figure A - Best Practice Technology Support Model
III. Components of the Best Practice Support Model

Standardization

The key to cost effective technology is standardization. Support staff become more effective when they can develop a deep understanding of a limited set of support requirements rather than a shallow understanding of a broad set. Commodity purchases of desktop equipment from industry leading vendors provide the lowest total cost of ownership. Standardizing on hardware configurations enables embracement of standard software configurations. CampusWorks encourages all institutions to enroll in the Microsoft Campus Agreement program. This enables institutions to standardize on a single release of desktop operating system, office productivity suite, and other standard software products.

This Best Practice is extended to other areas. CampusWorks encourages institutions to standardize on a single email product or at the minimum an email product for students and a collaboration suite for faculty and staff. CampusWorks also encourages institutions to develop strategies for keeping software products up to date on release level as a mechanism to embrace standardization as a tactical and strategic objective.

Network

The computer is literally the network in the college and university technology environment. Any technology related work that is done on behalf of the institution will eventually be communicated or deployed or used on the college network. An effective support model must begin with a functioning network. If the network is unstable or slow, an effective support model is not possible.

The starting point to achieving a functioning network is to perform a comprehensive assessment. The assessment will identify requirements for remediation and opportunities for improvement of performance, reliability, security and cost reductions. Opportunities for cost reduction are numerous. For example, leased lines are an ongoing expense. It is common to find fiber in close proximity to the college that can be purchased or leased with a short return on investment. High speed point-to-point wireless technologies are mature and often have a ROI of less than twelve months. High speed WAN wireless technologies are often found to be more reliable than leased lines.

The assessment should include the cable plant, electronics, wide area network connections, network topology, and security. Out of date software release levels of networking equipment is a common source of difficulties. Remediation and acquisition of equipment should focus on standardization.
**Infrastructure**

Infrastructure includes the servers, the network operating systems, the printers, the wireless networks, the email systems, anti-virus, anti-spam, firewalls, etc. In short, infrastructure is a collective term for all of the pieces of technology that are provided to and used by the client community. The role of infrastructure in the context of the support model is stability, reliability, availability, performance, and ease of use.

From the perspective of the client, the infrastructure is good if one is unaware that there is anything wrong. The infrastructure is bad if one becomes aware that something that should work does not. The goal of a high quality IT organization is to provide good infrastructure.

Clients call the Help Desk when infrastructure does not work. So the Support Model is strengthened when the IT department adopts a well articulated Technology Tactical Plan. The plan includes a comprehensive assessment of technology across the institution. The plan drives an architectural and project strategy that builds and integrates technology in such a way that service is improved, support requirements are reduced, performance is improved, and costs are reduced.

**Desktop Computers**

Industry numbers demonstrate that the cost of technology equipment increases with the age of the equipment. The highest cost for old equipment is in the support model. CampusWorks recommends that institutions adopt a life cycle management strategy for all technology equipment, with desktop computers as the highest priority. The life cycle management assigns a specific life span to a piece of technology equipment. The life span is based on industry standard data of the cost per year of ownership. The life span of commercially available desktop computer today is four years.

Life cycle management supports the following best practice business functions:

- Predictable technology budget planning
- Comprehensive inventory controls
- Standard hardware platforms across the institution
- Standardization of software based on the minimum hardware standard
- Improved support model based on standard hardware and software

Implementation of the life cycle management strategy removes obsolete and unreliable equipment from inventory. This improves the productivity of the entire institutional community.
Software

CampusWorks recommends that institutions enroll in the Microsoft Campus Agreement (MCA). The agreement provides access at very low unit cost to a standard suite of Microsoft software. The MCA enables an institution to standardize on software release levels across the institution. This will typically include the desktop computer operating system, office productivity suite, and user license access to other Microsoft technologies. Standardization of the desktop Microsoft software facilitates standardization of the release levels of other desktop applications: email, collaboration tools, drivers for printers, etc.

CampusWorks strongly recommends that institutions implement an image management software tool. The tool allows institutions to build software images of desktop workstations on a centrally managed image server. The images can then be projected across the network to one or more machines as needed. Using this technique, a software patch could be applied to all of the computers in a lab by a Help Desk technician working at his or her desk. The image management tool also greatly facilitates the automated application of software updates and patches to all college computers.

Classroom Technology

The historical model of supporting classroom technology involves delivery of equipment on a demand basis. This model derives from the historical high unit cost of equipment and the historical low training and adoption levels of technology in teaching and learning. Both of these business drivers are now out of date.

Commercial course management systems (CMS), including Blackboard and WebCT, have reached a level of maturity that encourages commercial textbook publishers to include a CMS plug-in with the instructor textbook. This development has substantially lowered the assimilation threshold of technology in the classroom. Previously confined to the sciences, classroom technology is now in demand and widely used across all academic disciplines. The technology requirements for use of a course management system in the classroom are a network connection, a computer, and a data projector.

All higher education institutions have strong faculty development programs, designed to assist faculty in the use and assimilation of technology into the academic discipline. To make these investments cost effective, the technology must be present and functioning when the faculty member enters the classroom. Reliability of classroom technology is greatly enhanced by permanent installation of technology in classrooms.

Technology used in classrooms is available at commodity prices. For example, high quality data projectors are available for less than $2,000. High quality combination VCR/DVD players are available for less than $200. There is no budget model that can justify paying staff to deliver low unit cost equipment.

Permanent installation of technology equipment in classrooms is a Best Practice that CampusWorks strongly recommends.
Staff

The heart of an effective support model is a well trained staff that has the tools necessary to do their jobs. IT departments in higher education often have a poor reputation in the institution. The complaints frequently revolve around lack of responsiveness, timeliness, and effectiveness. An effective support model begins with creating a technology environment that can be supported. The steps recommended in this document are all necessary to achieve that starting point of an effective support model. These actions will define a scope of responsibility that a trained and motivated professional staff can support effectively.

CampusWorks strongly encourages implementation of a life cycle management strategy for desktop computers. An outcome of this activity is that the desktop inventory is on warranty. Hardware repairs are done by the vendor, not institutional staff. Staff previously committed to servicing hardware can be retrained and reallocated to the Help Desk.

CampusWorks strongly recommends implementation of standard software using a centrally managed software image product. An outcome of this activity is that staff need to make ‘house calls’ only on very rare occasions. Staff previously committed to servicing desktop equipment in the field can be retrained and reallocated to the Help Desk.

CampusWorks recommends that all members of the IT staff have a documented training plan. The training plan should be derived from the requirements of the job description for each staff member and the skill level of the staff member. The training plan is monitored by supervisors as a part of the performance review process. A typical training plan used for Help Desk staff using CBT resources may look like the following:
24x7 Support and Outsource

The technology support model needs to be present during the academic service delivery hours of the institution. In an age of 24x7 Internet access and asynchronous teaching and learning, institutions need a 24x7 support model.

Faculty using technology in classrooms need a support model that includes professional on-site presence. It follows that the Help Desk staff model described in the previous section needs to be serviced by institutional professional staff during the hours of on-campus academic service delivery. The institutional staffing levels needed for this support model will differ greatly among institutions. For community colleges, the Help Desk will typically need to be staffed in the area of 72 hours per week. This defines a requirement for professional staff during evenings and weekend on-campus academic service delivery.

CampusWorks strongly recommends that institutions outsource the 24x7 Help Desk to service providers in this marketplace. Presidium Learning is one of a number of vendors in this marketplace. Presidium is somewhat unique, focusing on the higher education marketplace with core competencies in the commercial Course Management systems.

The advantage of on an outsourcing partner for Help Desk services is that it delivers an extension of the core academic support model to 24x7. The institution provides presence for on-campus support needs. The Outsource partner provides 24x7 expertises in the major academic technology requirements: Course Management system, Microsoft Office support, userid/password support, and integration to the College Support Model. Costs for a 24x7 Help Desk are typically less than the cost of a single professional staff member.

Knowledgebase

The Knowledgebase is an electronic repository of best practice solutions to common problems. A Knowledgebase is an invaluable tool as a component of an effective support
model. The Knowledgebase enables the Help Desk staff to provide the same high quality answer each time the question is asked and independent of the Help Desk staff member who fields the call. The Knowledgebase can serve as a rich repository of useful information that is unique to the institution.

Most service providers, including Microsoft, Dell, and Presidium in the outsource sector, provide access to a Knowledgebase that was created by the company and focuses on the core competencies of the service provided. CampusWorks recommends that institutions create a Knowledgebase as a component of the Support Model. The Knowledgebase will contain:

- Best Practice answers to technical questions
- Repository for institutional process and procedure materials
- Documentation on use of systems or business processes
- How-To’s (ex: How do I connect to the wireless network?)

The Knowledgebase is typically used by the Help Desk staff while taking calls. Additionally, the Knowledgebase can be deployed as a resource on a college portal and effectively marketed as a self service Help Desk.

To be effective, the Knowledgebase must:

- Be available – deployed on the College portal
- Contain useful information – content provided by experts
- Contain information that is clear – entries written by professional technical writers

CampusWorks recommends that IT departments use professional technical writers to write the Knowledgebase articles. Technical writers are trained in effective interviewing techniques. Technical writers also have the writing and presentation skills necessary to consistently produce high quality Knowledgebase entries. Often, Technical Writing programs produce excellent intern candidates who bring mutual benefit to the programs and the institution in creation and development of the Knowledgebase.

**Identity Management**

Identity Management is a technology and infrastructure framework for managing information about people. In the case of colleges and universities, this includes our students, faculty, staff, and the various entities such as vendors, partners, consultants, etc. The goal of Identity Management, in the context of the Support Model, is the implementation of a single and authoritative source of information about people and their relationship to the technologies that they use.

Industry data show us that roughly 70% of the cost of the Support Model is in the management of userids and passwords. People forget both. The more people and userid/passwords that are present, the higher the support cost. Identity Management
implements a single userid/password file for authentication. In the ideal state, a student will have a single userid and password for all of the technology services that the student uses. Identity Management provides a single authentication point so if a password is changed, the new password is then in use for all of the applications that the student uses.

Identity Management has the potential for dramatic service improvements and dramatic reductions in support costs. CampusWorks recommends this technology and has implemented the Identity Management framework in a number of client institutions.

IV. Summary

The support model described in this document is comprised of many components. The sum of the parts yields the Support Model that the institution sees and uses. Each component of the support model is important and must be addressed and managed to optimum results.

The network and infrastructure must be well engineered and supported. Without these components, the desktop strategy cannot work effectively. The desktop computer strategy, including life-cycle management and image management are critical components. Without these components in place, support staff will spend excessive amounts of time on the hopeless task of nurturing obsolete hardware and software. The staff development and training plan are critical components. Without this component, staff will lack the skills to support a high quality technology environment. The classroom technology component is critical. Without this component, high cost support staff will spend their time carrying low cost equipment around the campus. The 24x7 outsourced Help Desk is a critical component of the support model. Without this component, faculty and students will lack the technical support when they need it most, after hours and on weekend.

The Support Model is a critical component of technology service delivery. Attention to detail at the component level will yield a Best Practice result.
Appendix C: Identity Management Best Practice

Directory Services and Identity Management
Best Practices in Higher Education

I. Introduction

This document describes the CampusWorks Inc (CWI) approach to best practices in Identity Management and the Directory Services framework. This best practices approach provides a roadmap to improved efficiency, increased security, and lower cost of IT services.

The dictionary defines a directory as ‘a book containing an alphabetical or classified listing of names, addresses and other data of specific persons, groups or firms.’ Information technology also uses this term to denote an electronic file that manages access to applications. The file imbedded within the application contains a list of userids and the attributes associated with the userid. The userid represents a person, and the attributes include the password and various access rights and privileges that define the person’s ability to use the application. When a user launches an application on a computer, the application prompts for the userid and password and validates this information against the directory information contained within the application. The application then applies the rights and attributes to the user’s session. There are a number of problems with this model of directory services.

1. The institution has a portfolio that contains all of the computer applications that the College uses. Each of the applications in the portfolio has its own internal directory, unrelated to the directory in any other application. Each of the directories is built independently with userids and passwords. There are no reliable management techniques for synchronizing the userids and passwords across applications. Populating userids and passwords in the directory of each application is a manual or semi-automated process.

2. Users of the applications will have independent userids and passwords for each application. This inevitably means that users will choose easy to remember passwords and will commonly write down userids and passwords for easy reference. This substantially compromises the ability of institutions to secure access to mission critical applications.

3. Industry data tells us that 70 – 85% of support costs are related directly to management of userids and passwords for applications. This is particularly acute in higher education since the vast majority of our users are students. The high support cost forces institutions to compromise security in various ways such as providing easy to guess formulaic userids and passwords. Institutions are also forced to delay deployment of mission critical services such as email and portal because of the high support cost.

The business drivers discussed above define the need for identity and access to technology to be robust and well supported. The challenge for institutions of higher education is to construct a robust, effective and affordable directory services model. The remainder of this document discusses a practical and affordable framework for identity management and directory services. This architecture is based on the pioneering work of the Internet2 Middleware Initiative and the...
Middleware Architecture Committee for Education (MACE), published under the auspices and with the support of the National Science Foundation Middleware Initiative (NMI). Internet2 is a member of the Enterprise and Desktop and Integration Technologies (EDIT) Consortium, participating in the NMI.

For additional information and related topics, the reader is encouraged to review the following sites:

- Internet2 Middleware Initiative: http://middleware.internet2.edu/
- MACE: http://middleware.internet2.edu/MACE/
- EDIT: http://www.nmi-edit.org/
- NMI: http://www.nsf-middleware.org/

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has led to outstanding commendations from community colleges and districts throughout North America.

II. Identity Management Architecture

Figure A. Schematic Representation of Directory Services Framework
III. Identity Management Components

The Section II diagram shows the architecture of identity management with services that institutions commonly have or desire to have deployed. In this section we describe the components of Identity Management and how they work together to support the Directory Services Framework.

Integrated Administrative Information System

Enterprise Resource Planning (ERP) systems in industry are commonly known in higher education as administrative information systems. They support the common business functions in higher education, including admissions, financial aid, student records, accounts receivable, HR/payroll, finance, and alumni. Commercial administrative systems that provide an integrated data store are in common use at colleges and universities. An integrated system means that the information about people is shared across the modules that make up the system. In this way, a person who is registered for a class, employed at the institution or alumni of the college, is defined once to the administrative system.

For Identity Management, the integrated administrative system represents an authoritative source of information about people and their relationship to the institution. The administrative system is used to record real time changes in relationships of people to the institution. People become students. Students become work study employees. People are hired as employees. Employees retire or are terminated. Students graduate and become alumni. In each case, the integrated administrative system captures this information in real time. Identity Management leverages the integrated administrative system by applying the knowledge contained in the system to computing applications and systems that people use.

Directory

We discussed in the introductory section that the Directory Services framework is based on the Internet 2 Middleware Initiative and we provided references to in depth technical material. The directory shown in Section II is a standards based commercial product, fully compliant with the NMI eduperson schema. The schema represents the directory structure that defines people, their attributes about people. The schema can be easily extended to meet specific institutional needs. There are a number of commercial directory products available as well as public domain tools that can be used to build a standards compliant directory. CampusWorks recommends commercial products including the Microsoft Identity Information Server (MIIS), Sun iPlanet, and the Novell eDirectory products.

In practice an institution examines the schema and makes decisions about what information would be useful to have in the directory. The schema is sufficiently flexible that any information contained in the administrative system can be represented as an attribute in the directory. Each directory entry and attribute has a security profile that determines who can change the information and under what circumstances the information can be altered or displayed. The Microsoft product is fully integrated with the Microsoft Server 2003 and
Active Directory products. This facilitates use of the powerful group and profile features of Active Directory.

The directory is populated by creating maps between entries in the directory schema and fields in the administrative system. Extract utilities move the information from the administrative system into the directory. Update utilities capture changed information in the administrative system and update the corresponding entries in the directory.

An example of the power of the directory service may help describe the process. Suppose that we have an institutional policy that all full time employees are to have a college email account. Using Identity Management, when we hire an employee, the following steps can be fully automated and function in real time:

- New employee is entered into the administrative system by the HR office
- Automated directory load creates a person in the directory with attributes that describe a full time employee
- Directory scan utility indicates that a full time employee needs to be provisioned with a college email account
- College email system provisions employee with an email account using information contained in the directory

The Section II diagram shows an ad hoc entry into the directory. This is useful to capture people and entities in the directory who are not members of the institution but have a relationship with the institution that we want to define and manage. Examples are consultants or community partners who are not students, faculty, staff, or vendors. Once entered, the entity relationship can be managed through the directory.

The Section II diagram also shows a connection for White Pages. White Pages provide a real-time interactive electronic access to the information contained in the directory. As noted above, each directory entry and attribute has a security structure. This architecture provides discriminated access to the information. For example, an institution may wish to allow Deans, but not students, to have access through the directory to faculty home telephone numbers. Students may have access to the office telephone number of faculty.
Directory Access Server

The Section II diagram shows an access server connection to the directory. This is a component of the standards based NMI formalism discussed in the introductory section. The access server shown in the figure is a Lightweight Directory Access Server (LDAP). LDAP provides access to information and attributes in the directory to manage authentication and authorization. Authentication and authorization can be understood by the following analogy:

- **Authentication** – Do I have the key to unlock a door and enter a room
  - Answer – yes or no
- **Authorization** – if the answer to authentication is yes, then what activities can I do after I enter the room
  - Sit down
  - Open cabinets
  - Lock the door so that others cannot enter

In the context of Identity Management, we use LDAP queries to determine if we have a userid defined in the directory and that we have the correct password attribute. We use attributes in the directory to determine if we have authorization to use specific applications, such as those depicted in the Section II diagram.

In the next section we explore the many opportunities provided by the Identity Management Framework.
IV. Leveraging Identity Management

The Section II diagram shows services that institutions commonly have or desire to have deployed. In this section we describe these services in the context of the benefits and advantages of integration with Identity Management. Each of the services requires authentication and authorization. In each case the application prompts for authentication information from the user. The application then asks Directory Services to validate the authentication and apply authorization attributes to the user’s application session.

Network access starts at the desktop. Implementing authentication at the desktop for all users, including students, is a best practice. Integrated into Identity Management, the desktop authentication validates the user’s access to the college network, applies group and individual security polices, and applies storage management polices. The latter includes redirection and/or mirroring of desktop storage. The institution can also take advantage of network based storage using the Microsoft Webdav technology, or similar approaches from other vendors. This best practice implements true network based computing with access to personal files in the office, classroom, and home.

Course management systems (CMS) such as Blackboard and WebCT are ubiquitous in higher education. The support cost of course management systems and the burden on faculty is high, related directly to access to the system. Students often have difficulty connecting to the CMS because of userid and password problems. Identity Management substantially lowers this cost of ownership. The student has a single userid and password for all applications. If the password is changed for one application, the actual change occurs in the central directory and is changed for all applications that the student uses.

The institutional portal, coupled with content management, is a breakthrough technology. The portal aggregates web based delivery, provides authoritative information about and in support of the institution, and serves as an application delivery platform. We need only tell our students, prospects, faculty, and business partners about our portal to deliver information and the services of the institution. With Identity Management in place, we know a good deal about the constituent when they log in to the portal. The power of the portal, integrated with Identity Management, is the delivery of a personalized view of the institution and personalized services to that user.

Many institutions hesitate to deploy email accounts to all students. The principal reason for this is the high cost of support, principally userids and passwords. Institutions can realize substantial business process advantages by making email an official communication path to students. Universal email to students is a service improvement and enhances student teaching and learning outcomes by encouraging communication with faculty. The business driver is to lower the implementation and support costs of student email. Identity Management and the portal can accomplish this goal. The portal serves as the application delivery platform for email. Identity Management provides a userid and password that the student already knows. Identity Management can be used to automate provisioning of students early in the recruitment process to lower costs of communication throughout the student’s relationship with the institution.
Most institutions have deployed self service applications for administrative applications. These include online applications, online registration, online degree audit, etc. The burden for most institutions has shifted from direct service delivery to support of student userids and passwords during peak periods in the academic calendar. Identity Management substantially lowers the cost of ownership of self services applications. Student use the portal and email throughout the academic calendar year. With Identity Management in place, students use the same userid and password for self service administrative applications.

Many institutions have deployed of wireless network technology but struggle with management issues. The management challenges focus principally on security. Identity Management can be of substantial assistance. Technology is available to aggregate wireless access points to an authentication point on the network, i.e. BlueSocket and others. Identity Management can provide the security and authentication services necessary for institutions to securely deploy wireless technology that provides access to both the Internet and college services.

Remote Access to administrative systems is a challenge for all institutions. Remote access is a trade off of supporting institutional users and the security of confidential and financial systems of the institution. Support costs for remote access are typically very high. Since remote access usually takes place during off business hours, the support model is often frustratingly ineffective. Identity Management can improve security and lower costs for remote access. Identity Management implements policies, including the ability to remotely access administrative systems, based on a person’s relationship with the institution. Identity Management can be used to manage in real time the appropriate level of access. Coupled with two level authentications, Identity Management can substantially lower the cost of supporting remote access by providing authentication credentials that the user already knows.

The services described above are examples of how Identity Management and Directory services can be leveraged to lower costs of implementing services, improve the security of the IT environment, and reduce the total cost of the institutional support model.
V. Summary

Identity Management is a breakthrough technology for institutions of higher education; however Identity Management must be viewed as a comprehensive project. There are a number of prerequisites that must be in place and must work well. These include the following:

- The Administrative Information System must be fully implemented. Identity Management will use the administrative information system as the authoritative source of information about people and their dynamically changing relationship with the institution.
- The college network must be robust and well supported. Identity Management serves the entire institution with centralized services. The network is the principal computing platform for this framework.
- The Network Operating System used across the institution (NOS) must be up to date. Identity Management will use features of the NOS such as group policy, network shares, password reset utilities, and others.
- The desktop environment must be up to date and well supported. Identity Management will exploit features of the desktop operating system for security, network access, network shares, and others.

Identity Management allows institutions to centralize authentication and authorization to applications. This provides a single userid and a single password for all applications to which the user has access. The security features of Identity Management allow the institution to standardize password rules that are not easy to guess. Password change intervals can also be implemented. The centralized directory means that when a password is changed, it is changed for all applications.

Identity Management allows institutions to take real time action when a user changes a relationship with the college. If an employee leaves the institution, Identity Management, integrated with the administrative information system, can automate action in real time to terminate access to sensitive information. When a student registers for class, Identity Management can automate provisioning the student with the services needed to fully support the learning experience.

Identity Management dramatically lowers the cost of deployment of applications. The largest ongoing cost of applications is typically the support cost of userid/password support. By centralizing to a single directory, Identity Management provides a single userid and password for all applications. New applications are deployed to a user community with a userid and password that they already know. This means dramatically lowered costs of deployment for student oriented applications such as an institutional portal and student email.

Identity Management is a breakthrough technology for institutions of higher education. CampusWorks staff are experts on the technology of Identity Management and the methodology to fully implement Directory Services. We help our clients implement and fully exploit this leading edge technology.
Appendix D: Project and Portfolio Management Best Practice

A Community College Best Practice
Project Management Office

Introduction and Background

When appropriate, CampusWorks, Inc. (CWI) has been engaged to perform an in-depth assessment of a college’s existing Project and Portfolio Management (PPM) processes and procedures. CWI then proposes a comprehensive set of processes and procedures to optimize the allocation of IT staff to projects leading to increased efficiency and greater return on IT investments.

PPM maturity models are selected as appropriate references for a process framework to perform the assessment. These models allow the College to select process areas for review and institute improvement initiatives that will best meet the organization’s business objectives while mitigating organizational risk and controlling costs. Process areas for improvement include:

- Project Management
- Portfolio Management

CWI will typically conduct the assessment over a three-to-four week period. This is accomplished by obtaining objective evidence relevant to the implementation of the practice, comparing the objective evidence to a best practice expectation, and then achieving a determination or finding of practice implementation based on the difference between the actual and expected evidence. The assessment methods are designed to achieve accuracy, repeatability and meaningfulness of results.

The assessment includes interview sessions with IT personnel across the College. CWI also reviews multiple artifacts, including project databases and policy documents, and attends multiple operational review and project steering committee meetings to obtain additional objective evidence. Interview participants receive a standard confidentiality briefing explaining the assessment format and the non-attributable nature of the findings to be produced. Interviews and artifacts corroborate the existence of specific practices that reflect organizational maturity and challenges in the context of internal process improvements, adherence to current procedures and ability to execute. The assessment determines which process areas reviewed operate at an incomplete capability level.

This document provides the results of a typical assessment in the form of findings and recommendations. Findings benchmark the capability level of the process area assessed as of that date. Recommendations provide discrete actions to increase the capacity of the College’s IT staff to manage projects.

The following diagram illustrates the role Project and Portfolio Management (PPM) serves in bridging the College’s projects to strategic direction. A practical project management methodology is foundational to IT project success. The virtual Project Management Office (vPMO) assesses projects and portfolios, providing project consolidation and resource management. The vPMO also develops PPM reporting and executive dashboards that provide the information needed to evaluate strategy and set direction.
Executive Summary – A Sample

CWI is pleased to present the results of our assessment of the College’s Project and Portfolio Management process maturity and offer significant recommendations that will result in higher process capability and measurable benefits for both the clients of IT and for other internal stakeholders.

This document provides insight into the College’s capability by:

- Identifying the strengths and weaknesses of its current processes
- Relating these strengths and weaknesses to best practices
- Prioritizing improvement efforts based on gap analysis and expected effort
- Focusing on the most beneficial improvements given the current level of process capabilities

Weaving recommendations together with the College’s goals and a deep understanding of process improvement, CWI is able to recommend initiatives that are modular in composition and integrated in function. Using standard PPM techniques, the College can apply these methods by project, or horizontally across the organization, leveraging and increasing the capability of the organization.

Summary of Initiatives

1. Establish a virtual Project Management Office (vPMO)
   a. Implement vPMO team
   b. Research and Implement PPM tools
   c. Develop Training Plans and Provide Training

2. Implement Project Management Best Practices
   a. Establish the College’s Project Management Methodology
   b. Develop Project Management Templates
   c. Implement Project Management Processes

3. Implement Portfolio Management Best Practices
   a. Establish the College’s Portfolio Management Methodology
   b. Implement Pipeline Management Processes
   c. Implement Top Priority Tracking Processes
CWI is confident that implementing these initiatives will address the opportunities identified during the assessment and result in improved project success and better alignment of College resources with priority initiatives. CWI is prepared to partner with the College to bring these plans to fruition.

**Document Overview**

The purpose of this document is to capture the progression of interview findings into recommendations using best practices as the basis for transformation. From those recommendations CWI creates a set of initiatives to assist the College in meeting its process maturity goals.
The document is segmented into the following sections:

**Findings**: Strengths and weaknesses categorized by process area.

**Recommendations**: Recommendations to increase process maturity for process areas reviewed.

**Roadmap**: Roadmap of initiatives in order of priority to meet process and quality goals.

The following diagram illustrates the three fundamental process areas, projects, programs and portfolios and the evolution of process maturity. Best practices in PPM are based on these concepts.

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**Findings**

**Sample Findings Overview**

The findings are an aggregation of evidence collected via documents and interviews. The information collected is transformed first into notes, and then into statements of practice observations with challenges or strengths, and then into findings. Findings associated with a challenge represent gaps in process capability. Findings identified with strength represent components of a best practice implementation. The following table represents a list of sample business practices by process areas and maturity level used as a baseline for the findings.

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**OPM³ – Organizational Project Management Maturity Model (PMI)**

**Best Practices Directory**
Sample Project Management Findings

Project Management is the application of knowledge, skills, tools and techniques to project activities to attain project goals and objectives and meet project requirements. The purpose of project management is to foresee or predict as many of the hazards and problems as possible and to plan, organize, and control activities so that projects are completed as successfully as possible in spite of identified risks. The elements of risk and uncertainty mean that events and tasks leading to completion can never be planned with absolute accuracy. For more complex projects, even the possibility of successful completion might be seriously doubted.

Key elements of successful project management include:

- Establishing clear and achievable goals and objectives
- Balancing the competing demands for quality, time, scope and cost
- Adapting the specifications, plans and approach to the different concerns and expectation of the various stakeholders.

The following table lists sample project management process findings by type. These findings would form the basis for recommended project management improvement initiatives.

<table>
<thead>
<tr>
<th>ID</th>
<th>Typical Findings</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Multiple project databases exist with varying levels of information</td>
<td>Strength</td>
</tr>
<tr>
<td>2</td>
<td>Resources often work reactively to meet critical task delivery priorities</td>
<td>Challenge</td>
</tr>
<tr>
<td>3</td>
<td>Project Management is not a formal role within the organization</td>
<td>Challenge</td>
</tr>
<tr>
<td>4</td>
<td>Staff recognizes the need for better project management processes and has a desire to develop their skills and work to improve the organization</td>
<td>Strength</td>
</tr>
<tr>
<td>5</td>
<td>Resources are multi-tasking, often working on several projects in any given day.</td>
<td>Challenge</td>
</tr>
<tr>
<td>6</td>
<td>Difficult communication across geographically distributed resources</td>
<td>Challenge</td>
</tr>
<tr>
<td>7</td>
<td>Functional stakeholders are not engaged regularly throughout the project</td>
<td>Challenge</td>
</tr>
<tr>
<td>8</td>
<td>Leadership supports development of project management skills and personal growth</td>
<td>Strength</td>
</tr>
<tr>
<td>9</td>
<td>Project management is not a priority and is not adequately resourced</td>
<td>Challenge</td>
</tr>
<tr>
<td>10</td>
<td>Unclear requirements and project scope</td>
<td>Challenge</td>
</tr>
</tbody>
</table>
Sample Portfolio Management Findings

A portfolio is a collection of projects and other work that are grouped together to facilitate effective management of that work to meet strategic and tactical business objectives. The projects in the portfolio may not necessarily be interdependent or directly related. Funding and support can be assigned on the basis of risk/reward categories, specific lines of business, or general types of projects, such as infrastructure and internal process improvement.

The purpose of portfolio management is to establish an information technology portfolio as a primary tool to support IT resource allocation and related decision-making based on the College’s goals and direction. An IT portfolio demonstrates the relationships among current and planned investments. The purpose of the IT portfolio is to manage investments in IT as one would manage a portfolio of investments of assets such as real estate or financial instruments. The portfolio enhances the ability of key decision-makers to

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<tbody>
<tr>
<td>11</td>
<td>IT staff is under-resourced and/or not trained in disciplines and technologies needed to perform their project roles</td>
</tr>
<tr>
<td>12</td>
<td>Staff find it difficult to prioritize project work; work is very often re-prioritized</td>
</tr>
<tr>
<td>13</td>
<td>Product selections are made without comprehensive evaluation process or assessment of support impact</td>
</tr>
<tr>
<td>14</td>
<td>Limited visibility to project milestones and resourcing requirements exists across groups</td>
</tr>
<tr>
<td>15</td>
<td>Project management champions exist within the organization</td>
</tr>
<tr>
<td>16</td>
<td>Updates to project tracking information is not timely</td>
</tr>
<tr>
<td>17</td>
<td>There was no project management reference material identified in the interviews</td>
</tr>
<tr>
<td>18</td>
<td>Use of detailed project task and milestone tracking tools is minimal</td>
</tr>
<tr>
<td>19</td>
<td>Project scope and priority are adjusted through very informal means including hallway conversations</td>
</tr>
<tr>
<td>20</td>
<td>Collaborative workspaces and document repositories are established and available to project resources</td>
</tr>
<tr>
<td>21</td>
<td>Creative use of the trouble ticket workflow for tracking some project tasks exists</td>
</tr>
<tr>
<td>22</td>
<td>End user and other stakeholder involvement is informal with limited communication across project stakeholders</td>
</tr>
<tr>
<td>23</td>
<td>Project artifacts including project plans are not identified for large implementation projects</td>
</tr>
<tr>
<td>24</td>
<td>Processes based on the software development life cycle are in place for application development projects</td>
</tr>
<tr>
<td>25</td>
<td>Resource planning is done ad-hoc with limited visibility</td>
</tr>
<tr>
<td>26</td>
<td>Multiple IT resources are performing some level of project management today</td>
</tr>
<tr>
<td>27</td>
<td>Projects may use a single resource for requirements, development and assurance activities</td>
</tr>
<tr>
<td>28</td>
<td>There are no documented techniques for estimating of work.</td>
</tr>
<tr>
<td>29</td>
<td>Where project plans exist, they may not provide the level of detail required to manage critical people, data, facilities or equipment.</td>
</tr>
<tr>
<td>30</td>
<td>There is no stakeholder involvement plan to guide selection and participation of the type of people and functions needing representation in the project.</td>
</tr>
<tr>
<td>31</td>
<td>Current project plans, templates and guidance do not address all relevant planning items necessary to achieve an understanding of, a commitment to, or performance of the plan.</td>
</tr>
<tr>
<td>32</td>
<td>Projects do not use a standard means to document commitments across multiple projects where tasks from one project were dependent on another projects tasks (Program Management Area)</td>
</tr>
<tr>
<td>33</td>
<td>Project planning documents are not under change management</td>
</tr>
<tr>
<td>34</td>
<td>Project did not formally address risk assessment and risk mitigation</td>
</tr>
<tr>
<td>35</td>
<td>Projects did not have the visibility to reconcile resources and commitments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strength</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Challenge</th>
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</table>

assess the probable impact of investments on the College’s programs and infrastructure, as well as on the overall IT infrastructure.

The following table lists Sample portfolio management process findings by type. These findings form the basis for recommended portfolio management improvement initiatives.

<table>
<thead>
<tr>
<th>ID</th>
<th>Sample Findings</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>There is limited visibility to IT projects across the College</td>
<td>Challenge</td>
</tr>
<tr>
<td>37</td>
<td>Prioritization of Projects and Programs is not well defined or grouped into logical categories</td>
<td>Challenge</td>
</tr>
<tr>
<td>38</td>
<td>Published strategic plans are outdated limiting the ability to strategically align projects to College goals and direction</td>
<td>Challenge</td>
</tr>
<tr>
<td>39</td>
<td>Resource Planning at the IT organization level is limited</td>
<td>Challenge</td>
</tr>
<tr>
<td>40</td>
<td>The culture of the organization is not business process oriented</td>
<td>Challenge</td>
</tr>
<tr>
<td>41</td>
<td>Demand on the organization is driving need for project selection and prioritization processes</td>
<td>Strength</td>
</tr>
<tr>
<td>42</td>
<td>Projects are generated from internal and external sources with limited review and approval processes/controls or relationship to strategic direction</td>
<td>Challenge</td>
</tr>
<tr>
<td>43</td>
<td>Portfolio management to support IT governance has not been formally addressed</td>
<td>Challenge</td>
</tr>
<tr>
<td>44</td>
<td>The organization does not use a common language to communicate project goals and objectives and how they relate to return on the College’s IT investments.</td>
<td>Challenge</td>
</tr>
<tr>
<td>45</td>
<td>Budget planning process is not integrated with prioritized portfolio management</td>
<td>Challenge</td>
</tr>
<tr>
<td>46</td>
<td>The IT organization is realizing the need for project and portfolio management and in investing in improvement in both areas</td>
<td>Strength</td>
</tr>
<tr>
<td>47</td>
<td>No formal body is established to review and prioritize IT initiatives across the organization</td>
<td>Challenge</td>
</tr>
</tbody>
</table>

**Recommendations - Gap Analysis**

**Sample Recommendations Overview**

Gap analysis is based on comparing artifact reviews and interview findings with best practice models. The following sections detail the result of overlaying the College’s current process state with best practices providing discrete recommendations that will increase process maturity for the process areas reviewed.
### Best Practices for Project Management

**BP 1400:** The organization provides projects with an adequate workforce with the right level of competence for each project-related role.  
This recommendation addresses findings 2, 4, 5, 8, 11, 15, 25, 26, 27.

**BP 1500:** The organization has processes, structures and practices in place that allow individual projects to be effectively managed.  
This recommendation addresses findings 16, 17, 18, 23, 24, 28, 29, 31.

**BP 6190:** The organization has integrated project management tools to provide a project view of the organization.  
This recommendation addresses findings 1, 14, 20, 21, 35.

**BP 2000:** Project integrated change control process measures are established, assembled and analyzed.  
This recommendation addresses findings 12, 19, 33.

**BP 1160:** Project communication management processes and measurements are established.  
This recommendation addresses findings 6, 22.

**BP 5430:** Open communication exists between all project team members and stakeholders.  
This recommendation addresses findings 7, 30.

**BP 1410:** The organization has processes that provide projects with professional project manager.  
This recommendation addresses findings 3, 9.

**BP 1210:** Project procurement management processes are established.  
This recommendation addresses finding 13.

**BP 1120:** Project risk management processes and measurements are established.  
This recommendation addresses finding 34.

**BP 2550:** Project scope verification processes are established and executed.  
This recommendation addresses finding 10.