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**ACUTA's Core Purpose is to** support higher education communications technology professionals in contributing to the achievement of the strategic mission of their institutions.

**ACUTA's Core Values are:**

- Encouraging and facilitating networking and the sharing of resources
- Exhibiting respect for the expression of individual opinions and solutions
- Fulfilling a commitment to professional development and growth
- Advancing the value of communications technologies in higher education
- Encouraging volunteerism and individual contribution of members
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While one can make an argument that higher education is not business, any healthy university must adopt, deploy, and use business-like practices as a steward of state money.

-Dr. Charles W. Sorensen
President, University of Wisconsin-Stout
Discover why our clients choose WTC to develop strategic technology business plans for acquisition and implementation.
Technology Leaders' Role Is Expanding

We have entered a new phase in our technology careers over the last few years that requires us to change the way we think and act. The role of technology leaders today has grown into one of "strategic thinkers," who envision new opportunities and proactively sell them, and "facilitators," who deploy creative and efficient methods to reduce costs, improve service delivery, and provide new technology platforms for teaching, learning, and research.

We have all heard and learned about converged communications. These new converged communications provide us opportunities to introduce and deploy these technologies far differently than we have before. Converged communications services can be bundled and rates developed to offset potential voice losses. They can allow the introduction of new technologies to the community and the opportunity for broader use of a variety of technologies. They can encourage us to think in new ways about how we support our end users as they learn and embrace these enhanced services.

This is a time to think strategically about the future of technology on our campuses and creatively address the introduction of the variety of new technologies, including importantly converged communications. We must be open to change in our own information technology organizations. And, we must understand the impact of technology changes on our end users, staff, and, ultimately, on the institution itself.

These are exciting times in technology, but not without challenges. CIO Magazine states that project backlogs are the number one problem facing technology organizations in 2006. While we all agree that projects seem to never cease being a challenge, there are other challenges: funding issues, inadequate staff skills, more competitive salary markets, security concerns, decreasing revenue streams, and so it goes... To be successful we must focus on those technologies that have the highest value to the institutions we serve, set realistic expectations for deployments, and communicate, communicate with all levels of management and our community.

This issue of the ACUTA Journal provides us with valuable knowledge "from the front" on addressing these challenges through strategic thinking, best practices, and plain old sharing of experience. There is no greater gift than learning from the experience and expertise of others as we look forward to the greater integration of information technology in achieving the goals of our institutions.
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ACUTA Resources Help Manage the Bottom Line

Many ACUTA members are responsible for managing the business of communications and networking on their campuses. ACUTA has always recognized that fact by offering resources that are focused on business and financial issues, as well as on the technology. We take the commonsense view that both aspects of communications technology management are important to a successful operation.

ACUTA members arrived at their current positions from a variety of backgrounds. Some came from carriers or IT industry suppliers. Some managed these functions for private sector or governmental organizations. Some were administrators or faculty from different areas of the institution, who had communications technology added to their responsibilities. It is always fascinating to hear how our members got where they are today, and I marvel at their interesting career paths.

However, they all have one thing in common: Whether they are responsible for overall departmental management, customer service, network infrastructure, wireless voice and data, security, residential technology support, or any of the myriad of components of campus communications and IT operations, the bottom line is increasingly important. As traditional revenues decline, there is an increasing need to manage operations with an eye to efficiency, cost avoidance, cost savings, and generating new forms of revenue.

Consciousness of the bottom line is vital at all levels of the organization, from technicians and other frontline personnel to senior management. It requires a commitment to changed business processes and a willingness to challenge the status quo in vendor relationships, internal systems, and established ways of doing business. It takes a willingness to reexamine existing contracts and procedures that may have been the best options when first developed, but that may have room for improvement now in cost savings or cost avoidance. It also requires being open to collaborations within and outside the department or the campus that could result in benefits to the bottom line.

ACUTA has a number of resources that can help with this process. Here are a few that I recommend you and your colleagues explore:

- **ACUTA Website.** Search the ACUTA website for the term financial and you will see over 400 occurrences. While they certainly won’t all apply to your needs, it is worth some time to peruse the articles, listserv discussions, resource library documents, and other resources that come up. Using the search tool on our website can save you time and help maximize the value of your dues investment.

- **ACUTA Journal.** This issue of the Journal is highly focused on the bottom line, and it contains several articles that will stimulate thinking and provide ideas you might be able to use. Many past issues of the Journal also contain articles on management and financial issues.

Since Winter 2004, full issues of the ACUTA Journal have been available online in a searchable format to members with a “My ACUTA” account at http://www.acuta.org/relation/DownloadFile.cfm?docNum=910. Winter 2004 was themed “Financial Issues and Student Telecom Services” and contains several articles on cost savings, outsourcing, bench-
marks for IT investments, and similar subjects. A review of Spring 2005 reveals articles on business aspects of student cellular service and IP telephony.

Abstracts of all issues since 1997 are also available (also in searchable format), and if you find an article you wish to read, you are welcome to contact the ACUTA office and request a copy.

- **Educational Programs.** Audio tapes or CDs of all past audio and Web seminars are available for purchase, even if you weren't able to participate in real time. Many of these programs deal with financial issues, and most feature communications technology professionals who work in a higher education environment. Others feature consultants whose expertise would cost thousands of dollars outside of the ACUTA program setting. Check the ACUTA E-Store at http://www.acuta.org/dynamic/store/store.cfm to review past titles.

In addition, many seminar tracks have provided two and one-half solid days of education and information about bottom-line issues. The handouts from these programs are also available for purchase from the E-Store at a nominal fee of $15 each (plus shipping). While the handouts don't replace the experience of being there and sharing with colleagues, they do contain valuable information from our expert presenters that is generally not available from any other source.

The Annual Conference handouts are also available on CD in a searchable format containing handouts from 50+ sessions each year for a very reasonable fee. Many of these include financial and business topics.

We also have audio and video of selected sessions from past Annual Conferences available at no charge via the ACUTA website. For example, the video of “Budget Models to Prepare for Evolving Technologies” from the 2005 Conference, presented by the IT financial services manager at a large university, is packed with good information.

- **Electronic Discussion Groups.** ACUTA has two active and thriving listservs—a general higher education telecom list, and a list focusing on VoIP. Together, they have more than 1,440 subscribers. Don't overlook their combined experience—they are generous with advice and more than willing to answer your specific questions, share their experiences with financial challenges, and generate ideas for cost savings or revenue. You can subscribe via the ACUTA website.

I hope you will consider these resources as valuable tools to help you mind the bottom line in your own operation. As you can see from the wide array of offerings available to our members, ACUTA is committed to addressing business and financial issues in communications technology.

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In the early spring of 2004, The University of Connecticut's (UConn's) network engineering and design and telecommunications departments began to look at initiatives geared toward cost savings. Because of a series of rapid consolidations and other business priorities, telecommunication expense management had been pushed to the back burner.

Four areas were identified as being high priority because they had the potential to generate substantial savings in a short period of time. Essentially, the "low-hanging fruit" that could produce the greatest returns was looked at first. However, no category of spending was deemed sacred, and eventually all telecommunications spending will be examined.

The four areas that were first investigated included:

1. Business practices
2. Existing contracts
3. Vendor billing
4. Open purchase orders

Each one of these areas did supply a substantial revenue return. These returns were in both immediate onetime savings and long-term, multi-year savings.

**Business Practices**

When network engineering and design and telecommunications merged, an opportunity developed to reshape the organization. Both groups maintained customer-service areas, and there were openings in each. As a result of the merger, one customer-service facility was created. This left several unfilled open positions that could be used elsewhere in the organization.

It was agreed that what needed to be established was a strong unit to maintain the business functions. These combined groups were running their unit with just one part-time person in place who oversaw the entire fiscal operation. The structure was re-searched and thought through. What resulted was the creation of a business unit responsible for all billing, purchasing, inventory, and financial functions. To staff this unit, two people were hired full time and one person was hired part time.

Several different qualifications were identified for each position. One position required strong skills in the fiscal knowledge of the university. Another required strong knowledge of telco business functions. Yet another required strong inventory-control skills. Over the course of a year, all three positions were filled.

The efforts of the individuals and the ability of the organization to adapt to change quickly have helped move forth all of the cost-saving initiatives identified in this article. Sound business functions and practices have been adopted and put into place. Financial tracking is out of the hands of the project managers so that they can focus more on the projects. All project accounting functions have been
enhanced. Control of and responsibility for inventory has been completely revamped.

Twice a month, fiscal reviews are conducted by the business office, directors, and managers. All budgets and line items are reviewed. Once a month, all projects are reviewed. Each project has an electronic folder that contains the project scope document, original budget information, all purchase orders, project plan, and any other supporting documentation.

**Existing Contracts**

- **Voice Switch Contract**
  We began our cost-savings quest using the existing maintenance contract on our central-office-class voice switch. For the last 20 years, this contract had been sole sourced to the same vendor. Only twice before had an attempt been made to bid this maintenance. An RFP was created once at the installation of the switch and again at the 10-year point.

  Unfortunately, the only response to the previous RFPs came from our existing vendor. In order to gauge what options might be available to UConn, an RFP was created and issued again for maintenance. The RFP included onsite support 8 hours a day, 5 days a week, with a requirement to remotely monitor the switch 24 hours a day, 7 days a week. The RFP also required that the respondents provide a cost-element table that would include what they would support, what class of technician would be providing support, and what the cost was per trade at an hourly rate.

  The initial response to the RFP seemed disappointing: Again, the current vendor was the only bidder. However, what resulted was a detailed listing of what the vendor was providing for support and what each element would cost.

  Using this chart of services, we decided what type of support services we wanted from the vendor and what type of support we could provide ourselves. Of course, we had to do a risk analysis and decide what type of risk we wanted to assume. On the basis of an initial proposal of $1.3 million dollars, UConn reduced the contract to $850,000—a savings of approximately $450,000.

- **Ad-Hoc Cabling Contract**
  Network engineering and telecommunications created an RFP for the installation of voice, video, and data cabling in support of telecommunications systems. This cabling was for small-quantity additions to existing buildings to accommodate office additions and renovations. The contractor was responsible for providing and installing parts and materials, including horizontal pathways such as cores, sleeves, and raceways and a complete horizontal cable link. An average run was estimated and five jack types and eight wall surfaces were identified. Each vendor was required to respond with a cost table for all possibilities.

![Quality Management System Remote Access ... Monitoring & Call Recording](image)

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We were surprised to find some major discrepancies that occurred in the past 9-month billing cycle concerning one vendor....To our amazement, they owned up to their errors and agreed to reimburse the university over $500,000 in billing anomalies.

The result of this bid drove the cost of installation down considerably. The prior cost for this work was based on an estimate of $400 dollars per hour, with the average job requiring 3 hours to complete. Today, these same installations are based upon the jack and surface type at a flat rate. This new cost averages $275. This has resulted in an average cost difference of $1,200 versus $275 per jack. Cost savings here is $975 per jack. We have not yet estimated the cost savings for the year, but this will be substantial.

* Data Switch Contract

Network engineering and design in late fall 2003 took on the task of inventorying and documenting the entire data networking infrastructure. Out of this study came a document entitled “The Network Master Plan.” This plan, adopted by the university administration, is the road map to be followed for all future network upgrades.

Up to this point, network engineering had been supporting four different equipment vendors. For ease of support and installation, a single vendor solution is being created. At the same time, a decision has been made to assume a little more risk in the maintenance of our devices. To that end, only core devices had extended maintenance renewed. Maintenance has been canceled on all edge devices, and we have opted to maintain a certain percentage of hot spares should any of these devices fail. This decision resulted in an annual cost savings of $200,000.

**Purchasing Synergies**

Several options are available to network engineering and telecommunications for purchasing goods and services. RFPs can be created and sent out through the purchasing department. The units can purchase directly off of any existing State of Connecticut contract. Lastly, any contract in place with the Consortium of College and University Purchasing Administrators can also be used. These options allow for a lot of flexibility.

Also in the fall of 2004, UConn Storrs campus began to develop synergistic opportunities with colleagues from the University Health Center, the Connecticut State University System Office, and the Connecticut Education Network. Several meetings were held among the agencies.

Contracts were reviewed by all and modified where appropriate so that language included all the state agencies. Items such as the cost of domestic and international long distance, T1 lines, DiDs, Internet bandwidth, and many others were all explored. Because of these discussions, we were able to take advantage of lower rates for many existing services. Savings realized from this initiative were close to $500,000.

**Data Network Equipment**

The Network Master Plan broke the network into three components: electronics, communication closets, and wiring infrastructure. The first phase of this plan is to upgrade as much of the electronic infrastructure as possible in the first 18 months. Funding for this became available in late winter 2005.

This plan calls for a single-vendor solution, so some steps were taken in the early spring of 2005 to begin heading in this direction. First, a bulk order for equipment was created and submitted to the vendor. Even though they had an existing contract, more preferable pricing was requested because of the magnitude of the order. Because we asked and it happened to be at quarter end for the vendor, we were extended an additional 5 percent discount, resulting in a onetime savings of $45,000.

Another area of investigation was the purchasing of gray-market equipment—equipment from third-party vendors who could still produce valid warranty and serial number identification on all network components. Up to this point, only factory-shipped equipment had been purchased.

As an experiment, a bid was put out for Gbic connectors. These are fiber connectors that allow switches to be connected with each other and the network core. Approximately 400 of these had to be ordered. The list price on these parts was $175,000. Our current vendor responded to the bid with an offer of $119,000. A gray market competitor responded with a bid of $24,000. We accepted the low bid and saved $95,000.
Vendor Billing

In the late spring of 2005, we began to do a review of our vendor bills. We hadn’t spent time recently going over invoices and checking to ensure that vendor bills matched contract rates. We established a point in the past that we would go to, which was 2 years in arrears.

We were surprised to find some major discrepancies that occurred in the past 9-month billing cycle concerning one vendor. We brought the vendor in and showed them what our study produced. We then gave them information and asked them to go back to their records and either confirm or refute our findings.

To our amazement, they owned up to their errors and agreed to reimburse the university over $500,000 in billing anomalies. Later, after more research, we did notice a mistake in billing that benefited the university, so that amount was returned to the vendor. This was about $27,000.

UConn network engineering and telecommunications has also conducted some audits for the Health Center. The first audit resulted in a savings of $50,000 for the Health Center.

Open Purchase Order

We looked into the way that we were using open/standing orders with our vendors. For instance, with a wiring contractor, we may have had an open order for $10,000. This would give us the flexibility to place an order with them multiple times throughout the year and only go through our purchasing department once. However, by setting up these standing orders, any money allocated to a standing order was considered to be committed dollars. Thus, if we had a lot of standing orders, we had fewer funds available for discretionary purchases.

We took the time to review all open/standing orders and adjusted appropriately. We took a look at historical purchasing data in order to help make the determination as to how much these orders should change. This resulted in a net return to discretionary status of about $170,000.

Conclusion

As stated, no category of spending has been deemed sacred. Network engineering and telecommunications has had some great successes, which have resulted in significant savings. However, we can’t rest on our laurels. We have set the bar high for ourselves and are looking at even more ways to produce savings.

Jack Babbitt is assistant director of network engineering at The University of Connecticut at Storrs. Reach him at jack.babbitt@uconn.edu.

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A Framework for Managing Best Practices

by Larry Foster
PAETEC Communications

Modern broadcast and publication mediums have deluged the world with information about the best way to conduct our business. In the high-tech digital reality of streaming data feeds, RSS alerts, instructional videos, and news broadcasts, we are faced with conflicting best-practice recommendations. The intent of this article is to clarify how to manage and deliver technology over a more holistic framework that outlines what processes, techniques, measurements, and methods are characteristic of world-class service delivery organizations.

What Is a Best Practice?

There is not a universally accepted definition of a best practice. The terms best practice and lessons learned are often used interchangeably. Lessons learned are usually the best approaches that have not been evaluated as rigorously as best practices, but still offer ideas about what works best in a given situation. Lessons learned provide excellent examples of what not to do. In addition, lessons learned are often from a specific program or project and are not universal in scope or application. Best practices that focus on what should be done are often no more applicable than lessons learned from a specific project. The extendibility of best practices results from the framework, which outlines what technology-delivery organizations should be doing to mature from a reactive to a proactive state of business.

Best Practices and Higher Education

It is not unusual to hear representatives from higher education express skepticism about best-practice recommendations that apply to other industries. Many people reading this article may argue that business service management practices will never be accepted by their respective institutions. This is in part due to cultural differences, but also because higher education stands above other industries in regard to its consistent ability to produce, year after year, world-class graduates who significantly influence the growth of the world economy.

Like other industries, higher education's business service management organizations (a.k.a. IT shops) are constantly challenged with providing cost-effective quality service to an ever-growing spectrum of customers. Higher education has an insatiable appetite for better, faster, and cheaper service delivery to faculty, staff, and students.

Technology by itself is only an enabler. Without the right best-practice framework in place, technology will not improve and could limit an institution's ability to improve operations.

The More Things Change, the More They Stay the Same

The chart in Figure 1 provides a high-level overview of cultural changes in IT organizations that have been driven by
major changes in technology and government regulations over the past 20 years. The chart, which overlays cultural changes over advances in technology and government regulations, does not completely represent the specifics of all changes. The intent is to illustrate the cultural changes that everyone has experienced as a result of improvements in technology and changes to government regulations. Organizations that have focused on best practices should be able to absorb these changes into the organizational framework with far fewer disruptions and financial catastrophes.

I See the Enemy and It Is Us

Best practices are discredited for many reasons. One of the key obstacles that prevents organizations from embracing a best-practice framework is getting stuck in a reactive state of business without sufficient buy-in from the proper levels of management or customers. Technology and management are organization enablers. Organizations often question the long-term success rate and effectiveness of a best-practice framework in implementing technology if it is fraught with a series of ineffective organizational changes and coupled with significant financial and personnel investments. The following mindsets are viewed as barriers to true success:

- There is no benefit to saving money. It will simply be redirected to support a different, less efficient, organization.
- There is no opportunity or prevailing need to change from the way we have always done business.

- Whatever is implemented needs to operate like the old system to avoid disruptions in service or the need to retrain personnel.
- There is a limited time to implement and no opportunity to refine the changes after production cutover.
- Specific support groups purchase technology solutions. Leveraging improved efficiencies between support groups is outside the scope of the project.

A Best-Practice Framework for the World

There is a well-established best-practice framework for service-support and service-delivery operations that is accepted worldwide. This framework is not based on any specific technology, biased toward a specific industry, or reliant upon government regulations.

Popular in Europe for years, the Information Technology Infrastructure Library (ITIL) best-practice framework is now gaining significant momentum throughout United States technology business service management organizations and with technology vendors. The framework originated in the United Kingdom’s Central Computer and Telecommunications Agency (currently the Office of Government Commerce [OGC]) in the late 1980s. The ITIL framework defines a set of comprehensive, consistent, and coherent codes of best practice for quality IT service management. OGC publishes detailed information about the ITIL framework to encourage the private sector to develop services and products (e.g., training, consultancy, and tools) that support ITIL best practices.
The IT Service Management Forum, a global organization consisting of more than 12,000 corporate and government members, is responsible for advancing IT best practices through the use of the ITIL. Organized into a set of "books," the ITIL offers a customizable framework of practices to provide high-quality service to internal users. The ITIL is applicable to all aspects of technology support because organizations can use the framework to make sure processes are necessary and efficient. The following information provides some insight into the elements of the ITIL best-practice framework and recommendations for getting started.

What Comprises the Framework?

The primary purpose of the ITIL is to establish a framework that defines a set of best practices, processes, and techniques to bridge and measure technology service delivery. The ITIL contains a suite of best practices that outline what needs to be done, but does not provide specifics regarding how the recommendations are implemented. Specific technology recommendations or certified technologies are not part of the framework. Vendors that claim to be ITIL compliant are indicating that they are providing services, software, or hardware that follows the guidelines established by the ITIL framework.

A performance management program is put in place to evaluate the effectiveness of IT’s business support and improvement operations. The most common diagram for representing the ITIL framework is illustrated in Figure 2. Two areas of the ITIL framework, service support and service delivery, are broken down into 10 primary processes explained below.

The Service Support processes are operational processes or end-user processes. Operational processes are focused toward management of actual IT resources.

The Service Delivery processes are tactical processes or customer-facing processes. Tactical processes are focused toward ensuring that what is promised is what is delivered.

Traditionally, help desks focused on recording and routing reported disruptions in service. Incident management, which replaced the concept of a help desk, supports the entire incident life cycle associated with provisioned services and includes problem management, change management, configuration management, and/or release management, as
explained below. The underlying objective of the ITIL best practices is to provide information to the appropriate personnel at the earliest possible point in the transaction, enabling timely resolution. The ITIL best practices focus on the interrelationship of all the supporting processes. The service desk is the point of contact between the customer and the service. This is why it is referred to as a function, not a process. The service desk encompasses all processes, tools, and techniques to manage the life cycle of provisioned services. Security management is concerned with the management of IT services' defined levels of security.

The objectives of each facet of Service Support are as follows:

- **Incident Management.** Initial restoration of end-user systems. A reported incident may be routed to Problem Management or Change Management. Incident Management provides the starting point for all Service Support transactions.
- **Problem Management.** How to reduce the number of incidents that an end user will encounter. It encompasses more than just resolving tickets by improving performance via key performance indicators (KPIs). Some of the common KPIs associated with Problem Management are mean-time-to-repair and breakdown of problems by service, organization, or geographic location.
- **Configuration Management.** Understanding all the components of the infrastructure. It focuses on providing insight into the configuration and interrelationship of provisioned services and network provisioning devices.
- **Change Management.** Controlling changes made to the environment so that they do not create negative effects. The efficiencies of Change Management are improved by having insight into Configuration and Problem Management.

Applications Management addresses the development environment or underlying software technologies that support your IT Service Support and Service Delivery operations. A vendor indicating that its software is ITIL compliant should be able to explain the processes used to support the continued improvement and controlled release of its products.
Figure 3. The MOST document

<table>
<thead>
<tr>
<th>MISSION</th>
<th>OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRATEGIES</td>
<td>TACTICS</td>
</tr>
</tbody>
</table>

- Release Management. The controlled modification to the environment. It depends on Configuration and Change Management to ensure that upgrades do not adversely disrupt the continuity of provisioned services.

The objectives of each facet of Service Delivery are as follows:

- Service Level Management. Ensuring the delivery services that are required by the business. The focus is to develop a definition of the business needs and manage agreements of control regarding the economic impact to support established service levels.

- Financial Management. Controlling costs of delivering IT services. All methods used to assign fiduciary responsibilities and control cost of provisioned services.

- Capacity Management. Ensuring that there will always be sufficient resources to match business demands. The focus is the optimal use of systems used to provision services (e.g., network provisioning devices, cable infrastructure, and human support resources).

- Availability Management. Making sure that the services are available when required. Availability Management defines the processes and controls the methods and tools used to ensure high or near-immediate availability of systems used and the personnel to support efficient provisioning and life-cycle management of all provisioned services.

- Continuity Management. Steps necessary to provide continuing IT services in the event of a major failure. It defines the processes, tools, and techniques used to ensure a quick and efficient recovery from any unplanned disruption of service.

Career Advancement through Certifications

Applying the standards of the ITIL best-practice framework has the additional value of leading to certification. There are three levels of ITIL certification, which are summarized below. The websites listed at the end of this article provide guidelines to enrolling in a certification program. ITIL certifications are not aimed at any vendor’s products or services and are recognized throughout the world for their reputation of objective and rigorous procedures.

Certificate Description Training and Examination

- Foundation. This level certifies a basic understanding of the 10 ITIL Service Delivery and Service Support processes and the Service Desk function. The foundation level requires two to three days of training and a one-hour multiple-choice exam.

- Practitioner. This level certifies a deep understanding of one ITIL process. The foundation certificate is a prerequisite. The practitioner level includes two to three days of training and culminates in a two-hour essay-style exam.

- Service Manager. Those who complete this level demonstrate a deeper understanding of all 10 ITIL processes and the Service Desk Function. The foundation certificate is a prerequisite. The service manager level requires twoweeks of training plus two three-hour essay-style exams.

Getting Started via MOST

There are many values derived from implementing the ITIL best practices. As they support and improve business, the business service management organization’s (a.k.a. the IT and/or telecom office) value increases, as does its ability to guide and measure improvements in performance.
Organizations should not take on too much at once; evolving into a best-practice organization will require the development of support units and a spectrum of customers. Starting and successfully implementing a business-service management initiative like the ITIL best practices will be based on leveraging two basic laws of classical physics, outlined by Sir Isaac Newton:

1. Every object (organization) in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.
2. For every action there is an equal and opposite reaction.

All the goals of each planned milestone should be documented on a single piece of paper, as illustrated in Figure 3, called a MOST document - Mission, Objectives, Strategies, and Tactics. If the content of the MOST document takes up more than one page, then your organization may be trying to take on too much at one time. Figure 3 illustrates how to lay out the contents of the MOST document. The following information provides guidelines for composing your MOST document.

• Mission. The mission is a short, clear description of the objectives of the organization and the values it believes in. The mission statement should stand out and motivate the organization without being fluffy. A good mission statement will result in an “oh yeah, that’s what we do” experience.
• Objectives. The objectives of the organization describe, in greater detail, what it wants to accomplish. Good objectives are:
  1. Specific to implementation milestones
  2. Measurable against value achieved
  3. Appropriate to the customer's requirements
  4. Realistic as to not inflate ROI or time frame
  5. Time-bound to establish when and how

  Use this “SMART” framework to help articulate objectives that will yield measurable and realistic results, guiding the priorities of the implementation.
  • Strategies. The strategies represent the combination of all decisions and measures taken to define and realize the objectives. The strategies provide a framework to prioritize objectives and decide how the objectives will be reached. Strategies will constantly change because an organization has to continually evaluate its priorities on the basis of ever-changing business requirements. The strategies in this document should reflect the immediate business requirements. Remember, the underlying theme is to motivate the organization to change now.

  The clearer the strategies are articulated, the less need there is to define how personnel are supposed to do their job.
  • Tactics. Tactics represent the specific implementation of strategies. Tactics are divided into stages to provide measurable milestones where progress can be monitored.

Final Thoughts

The intent of this article was not to replicate information that is readily available about the ITIL. Instead, the goal was to plant a seed in the minds of ACUTA members—those individuals who recognize an opportunity that will benefit their organization.

ACUTA offers an excellent forum to share ideas about the implementation and impending benefits and challenges of the ITIL’s best practices. The ITIL framework offers a suite of recommendations and a worldwide repository of information to help ACUTA members take their organizations to a new level. There are hundreds of websites that contain useful information about the ITIL and are a good starting point for your organization, including:

• ITIL Central
  http://itsm.fwtk.org/itk.htm
• Collection of ITIL books
  http://en.itsmportal.net/
• Advanced ITIL website
  http://nextslm.org/itil/itil_links.htm
• ITSMF USA homepage
  http://www.itsmfusa.org/mc/page.do
• Microsoft’s ITIL website
  http://www.microsoft.com/mof

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▼
Auditing, Honesty, and Big Savings

by Rob McCray
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There are as many scenarios for handling telecommunications-related bill paying as there are institutions. Some institutions just pay them without question. Others check every line item and question everything. Most are somewhere in between.

The four locations of our campus run the gamut of possibilities. At two of the locations, the telecom manager never even sees the invoices, while for the other two, I audit every line item of every invoice, spending more time on the phone questioning phone companies than doing MACS (moves, adds, changes).

Early on, before any assistants were hired to help me, it occurred to me that I couldn’t do justice to my fiscal responsibilities unless I developed a system for tracking expenditures. We are a small community college, and our telecom costs are fairly static month to month. I have all the bills for the two locations for which I am responsible come to one office, and I process them for payment at that point. I key all the appropriate numbers on each bill into an Excel spreadsheet that continues to change as my needs change. Each year I make a copy of it, delete all the data, update the page headings, and I’m ready to start the process anew.

We get several invoices for services directly from vendors, as well as a few intergovernmental vouchers for services we receive from the state. We are one of only three or four state agencies that can choose whether or not to use any state contract, and I use that to our maximum advantage. What I can get through the state more economically, I do. When I can do better on my own, I do that. By switching back and forth, I keep costs at a minimum as things change. I rarely get locked into anything that we may end up regretting.

Checking the Invoices

The following invoices get examined to varying degrees each month as they arrive in the mail and before I sign off on them for processing.

Local Exchange Carrier Invoices. We get a separate invoice for each location each month. Every single line item on the two local exchange carrier (LEC) invoices gets keyed into the appropriate worksheet.

After I key the numbers in, any changes show up instantly. Since we don’t add or delete lines often, the basic part of the bill is always within a few dollars each month. The long distance comes on a separate invoice from a different vendor, so the only parts of the LEC bill that change are for those five or six directory-assistance calls and third-party billing. I especially watch for slamming and cramming, which also tend to stand out using this method. I’m the only one authorized to add or delete anything, so when I see any change in the basic services charge, third-party billing, or even charges for operator assistance or collect calls, I’m on the phone in seconds. Collect calls
get reimbursed by the person who accepted them, since it is against our policy to accept them.

I've seen third-party charges for everything from toll-free voice mailboxes to marine-operator-assisted calls from boats in San Francisco Harbor. They all get disputed and credited back—some without question, some with a lot of threatening. Even required one company to produce a tape recording of one of our staff members accepting a deal they were offered. From the tape, it was obvious that they had taped her saying yes and pasted it after asking if she wanted to accept the service. That one took the threat of inspection by the Attorney General's office, but they credited it, and I haven't heard from them again.

**Directory-Assistance Invoices.** I point almost everyone's directory-assistance calls to a third-party directory-assistance supplier with PBX programming to keep those costs down as well. Our rate is about 25 percent of the standard per-call rate. I have 16 outgoing trunks at one location and two ISDN PRI trunks at the other, with all channels bidirectional. The location with 16 trunks shows up on the invoice as 16 line-item totals for the number of calls, and the other location's calls all show up as one total. Rather than add all those numbers up, I simply key the total number of calls in one column, key the total number of calls for the location with the digital trunking in the column for that location, and the spreadsheet does the arithmetic to calculate the total number of calls for the location with 16 ground-start trunks.

**Long-Distance Invoices.** I change interexchange carriers (IXCs) more often than most campuses, simply because of the timing of those state contracts. Typically, they are very good deals when they are first signed, but as rates drop through competition, the state is locked into higher rates than I can often obtain independently. Since there is never a penalty for leaving the state contracts, I negotiate my own deal with another carrier or reseller as I find a lower rate, being careful to weigh all the hidden charge rates and terms, particularly USF rates, which vary tremendously with the small resellers. I document all the summary data and totals from the IXC and track both the number of calls and dollar amounts for interstate, intralata, and intrastate calls from each location. Obviously, these invoices vary month to month because of the number of days we work and the projects that are active in various departments.

I look for trends and occasionally take a visual walk through the call detail looking for calls of inordinately long duration. Once in a while I find one that clearly represents abuse or fraud. We don't use account codes, and I can't prove who actually made a call; but when confronted with an accusation, the offender usually admits his abuse because he has no clue what I can prove. In one instance, an employee was ordered to reimburse $169 in personal long-distance calls to one number across the country, and the administration was investigating taking back more than 100 hours of his pay for time he spent on personal calls rather than working at his job. This is one instance where SMDR (station message-detail recording) proves invaluable. I search for the number associated with the ridiculously long call, and that usually results in the discovery of numerous calls to that same number from the same extension. Then it is just a matter of expanding the dates back in time to add up the evidence against the abuser.

**Intergovernmental Vouchers (IVs).**

The IVs are segregated by location, and you have to dig for what they are charging for each item or service. I don't get actual invoices from the Department of Technology and Information (DTI) for the state, but I get notices that they have submitted paperwork to take the money directly out of our fund lines and put it into theirs. They are the agency that administers all telecommunications-related issues and contracts for the state. They have a massive Centrex system through the LEC as well as numerous other services they provide, such as the wide area network (WAN) and others. We use them for some Centrex phone circuits and the WAN—service—which is very hard to beat. In the past, we used a lot of their Centrex, but I'm in the process of migrating away from it because of the decreasing value for the dollar.

DTI has opted out of having their own tie lines for long distance in favor of attractive rates for switched long distance, so the advantage to me is less now than it was before. We used to enjoy unlimited intralata long distance at extremely low rates in exchange for variable per-line charges at elevated levels. They literally totaled the whole bill for the Centrex, tie lines, and all their overhead; divided by the number of lines; and billed the agency for that result. Since I only send intralata long distance out via Centrex (except for a few fax machines that predate me), we made out like a proverbial bandit. With the new transport scenario, I save about two cents per minute because Centrex gets dedicated rates, and anything I send directly is billed at switched rates.

WAN service has improved dramatically in my nine years. We now get 100 MB TLS (transparent LAN
Service) for about what we started with for a T-1 SMDS (synchronous multipoint distribution system) circuit at 1.5 MB, but I just track the expenses since they come in on my IVs, and I point out errors in billing I discover to those responsible for the WAN.

Cellular Phones. I spend more time auditing a bill for 35 cellular phones than all the rest of my bills put together. Every total dollar amount gets keyed into the spreadsheet as with all the other invoices, but I track this one much more closely than any other because of the state laws regarding cell phones.

I key each user's airtime and text messaging totals into separate spreadsheets. Anyone who goes over his or her minute allowance, even though we are on a shared-minute plan, has to be reported to his or her dean or director and is sternly warned to curb usage or be prepared to justify each and every call as legitimate college business. That usually does the trick, but we have had a couple of staff members who were chronic abusers who had the privilege revoked. All this documentation is a lot of work, but it does allow me to do a thorough analysis of our needs and compare them to service plans available to adjust that service to minimize the dollars spent, even more than with the wired phone services.

Not all of these cell phones come out of my budget, but I track those that don't because no one else is in a position to do so. They don't require a lot of time, and I look like a hero when I find something wrong and either fix it myself or point out the problem to someone who can fix it.

Presenting the Documented Bill

The whole auditing process takes me about an hour each month for everything except the cellular bill, which takes about two hours by itself. After everything is documented with that bill, I have to fill out certification paperwork that everything is covered under our plans and there are no overcharges or, if there are overcharges, they are legitimate college business. The package I submit for payment is usually more than an inch thick.

The first worksheet of the spreadsheet is the "fiscal" page. It brings together the column totals for each service expense throughout the year and calculates everything that I could possibly need to know about the expenses. I can take one look and tell what the total expenses for each type of service are, what the total budget is, what the year-to-date budget is, what the year-to-date position against the budget is, how much we've spent year-to-date, and a great deal more.

I do all this because my job description says "tracks telecommunications expenses." Not being one who just does my job and nothing else, I go a step beyond. Everyone in a position similar to mine has to calculate a budget, whether they are in charge or someone above them is. This auditing and documentation process makes that unbelievably easy. Because our expenses are so static, the process takes me about 15 minutes per year, and I have never come close to being over budget for contractual services. Many of our colleagues spend days and months agonizing over the contractual services budget preparation each year. I have it all right there in black and white (actually I use multiple colors), so it's just a matter of asking what they will need to lose and what they want to add. I have the bottom-line figure right on the bottom of the "fiscal" worksheet.

Other Audits to Look Into

I suggest periodic audits of service levels in your switch. I prefer to predict the need for another trunk line rather than have people start complaining they can't make an outgoing call. Most SMDR packages can do all-trunks-busy reports. If your trunk cards are maxed out, put one in the budget request for the next year. If the switch is maxed out, it's time to look for a bigger switch, as I did for each location in 1999. We'd outgrown our 512 port NEC 1400s and installed two new 2400s in their places.

An annual audit of your customer service record (CSR)—available from your LEC—is both the biggest potential money saver and a huge source of aggravation. If you have never seen one, it is like looking at a pile of accounting figures with strange and seemingly cryptic codes all over the place. It is the phone company's bible, and it all makes perfect sense to them. I've found our LEC very willing to go over it with me. If yours is not, contact a CLEC in your area and as part of the "negotiations" for giving them some of your lines, they will be most happy to go over it and explain what it all means. Record the conversation and pay attention because you should be doing this every year, especially if your expenses change month to month or you have never analyzed it completely.

The first time I did a thorough audit of our CSR, I found a couple dozen strange codes I didn't recognize, and when I looked them up, they were for E&M tie lines. We don't have any E&M tie lines and hadn't had any for at least 20 years. When I called and pointed out that I was being billed for them, I was told I did have them. I checked all the telco blocks in the demark and found that some had
suspectedly been erased and nothing had ever been put on those pins. I asked them to check them for trouble and was told they weren't there. Then they were there, so I reported them out of service and was told there would be a charge if they found they were working. Since the cross connects had all been pulled, I felt secure in my conviction, so I agreed to pay any service charge for the testing.

The argument ended with my statement that if they could show me why I should be paying for tie lines between my campus and a parking lot that used to be the computing center for our local university, I'd quit complaining. They asked me for documentation for the disconnect order after they admitted they weren't actually there anymore, and I replied that I could not produce that, so they pulled out the old tariffs and agreed to credit us for three years' service, "the max they have to credit back." A few months later, I called our rep to check on an unrelated question on a balance and was informed I wouldn't owe anything on that account for quite some time. It had a $39,860 credit on it!

Once you have everything documented and under control, the fiscal part of the job should be a breeze. Audit the bills, and discover any unexpected charges. Then you can determine if they are legitimate vendor charges or abuse from inside and deal with it appropriately.

"Who Ya Gonna Call?"

Ghostbusters won't work in telecommunications unless your system happens to be haunted. There has always been an alternative explanation for glitches in the PBXs. I have found errors on bills in my favor, such as the $39,860 from the LEC and another $10,100 from one of the state contract IXCs, and many little credits for what I consider fraudulent charges added by third-party billing agents.

You have to walk a fine line when confronting phone companies. Always start out being nice. Convey your intention just to do what is correct, right, fair, or whatever the situation dictates. If that doesn't work, you may have to go higher up the vendor's ladder until you find a sympathetic ear or someone with the authority to give you what you want. Don't be disagreeable until you are out of other options.

When all else fails, and your policies allow it, let them know you are not backing down. You hold the ultimate trump card in your hand if you are allowed to use it. For example, on the job, I would not be allowed to complain to the state Public Service Commission (or Public Utilities Commission in most states); but I have complained on three occasions regarding my home and personal business lines when all else failed. That works, but it does sour your relationship, so only use that as a last resort when you are out of options. It is usually very easy when you find that sympathetic ear.

I have a monthly e-mail relationship with someone at our cellular carrier. Each month, they assess late fees because of the red tape we have to go through to get it paid. This is compounded by circumstances on their end that helped me win my argument. The bill is dated the seventh of each month, but checking the postage meter tape each month revealed it was not actually mailed until 10 to 15 days later.

So I protested the late fees and that worked. The rep went back to day one, added up all the late fees for two years, and credited the whole thing back in a lump sum. They continue to charge the late fee, but I send an e-mail with the amount and account number, and he responds within a half hour that the credit has been applied.

You can't beat that kind of service, but it takes a lot of effort to build rapport. I take it one step further: I even tell them when they err in my favor. I once pointed out an error that credited me too much for something I had complained about. It cost us $40, but now that vendor doesn't even check into anything I question; he just issues a credit. That was the best $40 I ever "wasted."

When contending with vendors, you have to find the angle that will push the issue in your favor: the postage date issue with the cellular carrier, the "show me where they are" statement with the tie lines with the LEC. There is usually some misstep that will help you get what you want.

The best advice I can offer is to be observant, be consistent, be fair, and be persistent. If you know you are right, don't back down. If they are right, admit it and move on. You will need to be able to argue another day.

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Leveraging SIP within Existing Networks: Reflecting on the University Network

by Al Brisard
Pingtel Corporation

Every university network has a predetermined lifecycle for which the IT manager is responsible for overseeing, protecting, extending, and more. At some point in that cycle, extending the life of an aging technology becomes counterproductive when balanced against the cost and benefits of change. And sometimes, external events take place that cause that balance to shift sooner than expected.

When VoIP technologies first emerged, the technology was embraced by incumbent telephony equipment manufacturers who simply added a new option to their current sales model. This meant that while VoIP still brought economic benefits associated with IP backhaul, equipment prices remained practically unchanged, and in some cases, increased for some devices such as IP phones. This made VoIP alluring to some universities but not so compelling that most would migrate to a complete VoIP solution.

Over the past few years, market factors have changed. The first change happened when the Internet Engineering Task Force (IETF) ratified the session initiation protocol (SIP), the standard for real-time communications. The second was the application of open-source development to SIP-based technologies. The combination of these two factors changed the economics of VoIP, similar to how Linux changed the PC world and Apache changed the Web server industry.

As universities reflect on their existing networks and consider how these changes apply, they should first recognize and feel comfortable that a forklift upgrade will not be required. Instead they can look forward to a seamless transition over time.

A Time for Reflection

Because the economics now favor the customer, a look at how SIP-based technologies can be leveraged within existing networks is in order. It is very much like remodeling a home or a building where an architect is engaged to construct a long-term plan that can be implemented in phases. Knowing the end objective is very important to maximize the efficiency of how you "get there from here." It is really no different with your network, except for the fact that your network architect is always reviewing and updating the plan instead of a once-in-a-lifetime effort.

During this reflection process some overwhelming themes about what is working and what is not working will become evident. Two of these themes are very predictable and actually point to the same issue but from different perspectives. The first theme will be with regard to the data network—which is most likely the area where most of the recent investment has taken place. It will be concluded that the heterogeneous data network came together quite nicely, is easy to modify, is economical to build, and meets the needs of the user community. The resulting perception will be a very positive experience with a
high level of confidence that the data network is meeting and will continue to meet requirements.

The second theme will be with regard to the legacy voice network. Most universities are still using TDM networks—either legacy PBXs or Centrex service, each with proprietary phones. It will be concluded that this network has performed quite well over the years but is extremely expensive to install and maintain, is hard to modify, and is highly dependent on a single vendor over the life of the solution. The resulting perception will weigh more on the negative side and acknowledge that the negative elements should not be repeated. If only the next version of voice had the business characteristics of the data network!

**Realizing the Dream**

So why have things worked out so well on the data network? The overwhelming reason for this positive experience is that it was built using open standards—Ethernet-based equipment predominately supporting TCP and HTTP traffic. To realize the same experience when implementing a new voice network or migrating any real-time applications to the data network, that data network must be audited to ensure it can properly handle real-time applications. Information technology groups that manage the data network at universities can easily comment as to the state of the data network relative to quality of service, prioritization of real-time traffic, and available bandwidth. Some adjustments may be required, but again, this further demonstrates the flexibility and versatility of the heterogeneous data network.

The second step is to make sure the chosen underlying protocol for voice or any real-time application will traverse the network as easily as HTTP. SIP is that protocol. SIP is based on IETF standards, and it is widely agreed in the industry that SIP is the standard upon which all real-time communications will be based for the foreseeable future. Due to SIP’s HTTP foundation and similarity, it can be broadly applied across networks, applications, and devices. It will be the unifying protocol that allows for interaction between networks (public and private, wired and wireless, personal and nonpersonal), applications (desktop and server, mobile and static), and devices (PCs, handhelds, servers, gateways, mobile, and static).

**Beginning the Transition**

Consider SIP-based applications that deliver real return on investment when evaluating them in isolation and that, at the same time, are in line with the long-term plan of a complete SIP-based network. This will ensure that the university experiences real application and investment benefits while knowing any investment is protected as part of the overall network transition plan. In other words, begin the transition to a SIP-based network one SIP application at a time.

Let’s look at a few applications for consideration:

- SIP clients. The quickest SIP application for a university to begin with is a SIP softphone offering that can be used as an instant messaging client as well as a voice and video client. Allowing students, faculty, and administration to download a SIP client off the university website will create a tight community atmosphere as well as off-load your current voice network of internal calling and even some long-distance traffic. As long as the other party also has a SIP-compliant client or endpoint, SIP calls can be made anywhere in the

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- SIP-controlled toll bypass. Universities can leverage existing data connections between campuses to complete voice calls between locations. By placing media gateways at each end of the data network, interconnecting with the respective legacy PBXs, and modifying PBX dial plans, a simple toll bypass application is created. But if you have several locations or campuses, this can quickly become unmanageable and complicated. By using SIP-capable media gateways, the call control across hundreds of gateways can be migrated off the gateways and easily implemented and managed from a single, high-availability control point. And better still, a basic SIP routing element is now an integral part of the network to be leveraged for additional SIP routing capabilities.

- SIP PBX. Whenever you add a location or department, incorporate a SIP PBX with SIP endpoints. Again, by using a SIP-capable gateway a SIP PBX can easily be connected to the anchored legacy network. A feature-rich SIP PBX is implemented on a general purpose server running Linux and connects standards-based SIP phones and clients. It also enables extensive remote voice and video capabilities such as work-at-home applications at virtually no cost. Every element of this application can be reused as part of the long-term transition plan.

- 802.11 voice network. Many universities are delivering 802.11 data capabilities on a campuswide basis. As part of these networks, access zone controllers are used to manage, segment, and optimize the wireless network. Most of the new software releases of these zone controllers account for the management and prioritization of real-time applications such as voice. By adding a SIP PBX to your segmented and secure 802.11 network, feature-rich voice services can now be added to enable complete campuswide mobility.

**Taking the First Step**

If it has finally been decided that the university is ready to place a toe in the SIP waters of standards-based real-time communications, the first question usually is: “How do I get started?”

The answer is simpler today than ever before. The world of open source is the place where state-of-the-art SIP technology and solutions can be found and leveraged based on unprecedented economics. Open source is often incorrectly linked to the word “free”; however, it should be known up front that nothing is actually free. Yes, you can go to open source communities, download software, and use it at your discretion. And it will most likely work well with some minor bugs. This is fine for testing in labs and small production environments where you really don’t care if something goes wrong. And it is perfect for universities to test the waters of what is possible and to experience the real benefits of the open source solutions. However, when transitioning to a production environment, a commercial distribution of this same open source solution should always be leveraged.

This is where “free” transitions to “unprecedented economics.” Commercial distributions of the open source solution typically mean that the same open-source solution is significantly tested, documented, and supported ongoing for the price of support. This has real value because it ensures that the solution will behave as required, ensures that it is supported going forward with regard to issues from time to time and ongoing feature development, and allows the university to realize the economic benefits of an open source solution with the performance and support you expect from a vendor-specific solution.

**Open Source Community**

To ensure from the beginning that the same proprietary deficiencies of the past are never replicated, working with a community that follows standards is critical. For a completely standards-compliant, open-source SIP community with real companies that develop and commercialize the solutions, the only real choice is SIPfoundry (wvrt.www.SIPfoundry.org). The SIPfoundry board and developer community comprises many of the top IETF engineers who actually create the standards as well as implement those standards. In addition, an extensive user community that has already been down this path is available to new users. Finally, a great deal of documentation is present and continues to evolve to meet the needs of both the developer and user communities.

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Interview

Charles W. Sorensen, Ph.D.
University of Wisconsin-Stout

ACUTA: Those who try to forecast the future suggest that the world economy is already more global than national. As we watch the economy evolving, what are the implications for higher education? Can technology be leveraged to gain an advantage? If so, how?

Sorensen: The global economy is having a profound impact on higher education. In many ways, state universities have been very parochial, focusing on regional or state issues, competing for students regionally, and concentrating economic development efforts locally. Thomas Friedman's book, *The World is Flat*, demonstrates clearly that we are not competing across state lines, we are competing globally. We are competing with countries such as China and India willing to commit billions of dollars to developing educational programs that are in direct competition with us.

It is imperative that universities respond with new, creative programs representing the needs of the new global economy. This will demand that we think and plan differently, that we break down the artificial barriers within colleges and universities, that we develop and use more effective and efficient delivery systems, and it could very well mean that we abandon our nineteenth century calendar as many proprietary and private schools are doing. Academic programs must be modified or replaced by emerging fields such as bioinformatics, nanotechnology, interactive digital environments, new materials engineering, all requiring interdisciplinary collaboration.

This approach requires a degree of risk-taking by states and universities; it requires, at least in my opinion, systematic change in our universities to create environments where such changes can be made quickly and effectively to meet new demands.

These new disciplines or combinations of disciplines and the delivery will be driven by technology, so a continued investment in the latest technology is mandatory—the infrastructure to support it and training for faculty and staff.

ACUTA: A sage educator once said that universities should not operate like a business, but they should operate in a businesslike manner. How would you interpret this? How do the business practices of educational institutions (or Wisconsin-Stout) compare with those of for-profit organizations?

Sorensen: Many educational professionals react in a very negative way when higher education is called a business because corporations and businesses rely on systems of production that are predictable, reliable, and focus on a single core value, profit. Higher education, they would argue, is driven by a different set of core values, ones focused on the individual student, different learning styles of each individual, and the search for knowledge. There may be a teaching/learning
process or system involved, but it cannot be a perfectly predictable model since it involves people and a single model does not work. It is clearly not a "production" model in the business sense.

Yet every university is in a sense a business, and the business is providing educational services to a wide variety of students or customers. Proprietary schools such as the University of Phoenix or DeVry are excellent examples of schools that simply are businesses; they sell a commodity—education.

While one can argue that public universities are not businesses, there are similarities between how a business and a university are managed. First, just as an organization in the private sector is accountable for effective, efficient use of resources, universities are as well. We are accountable to boards and/or system heads and ultimately to the taxpayers of the state. We must stay within our budgets, meet our financial targets, undergo financial audits, manage student enrollment, monitor retention and graduation, and much more.

Second, just as successful businesses plan strategically, so do successful universities. We have both short- and long-term strategic planning and, at least at University of Wisconsin-Stout, the process is open, inclusive, and very dynamic. Planning is driven by our mission and vision just as in the private sector.

A third similarity is alignment. This simply means that as we plan, we align our mission and vision with short- and long-term priorities, and then budget against the priorities. In this manner, we retain a sharp focus on how and why we expend dollars. Finally, like any well-run business, we are data driven and make data-driven decisions. Data are collected and analyzed on every process we use at the university. It is reviewed routinely, trends are analyzed, and the information is used in all planning and decision making.

So, while one can make an argument that higher education is not a business, any healthy university must adopt, deploy, and use businesslike practices as a steward of state money.

**ACUTA: UW Stout has received several million dollars this last year in research and education delivery grants. With looming cuts in federal dollars, do you see a strategy that might also include more corporate involvement in these funding sources? What cost-containment strategies have been the most effective in terms of balancing cost and, at the same time, maintaining the university's mission?**

**Sorensen:** In the past two biennia, UW-Stout has lost approximately 10 percent of our base budget, and there is very little likelihood that we will get any of it returned. Thus, seeking funds from other sources is significant. But it is also important to note that it is virtually impossible to restore base budget reductions through donations or partnerships.

In many ways, UW-Stout is well positioned since we have had an effective technology transfer program in place for well over twenty years. In 1992 we received NIST money to underwrite the Northwest Wisconsin Manufacturing Outreach Center (NWMOC), a center within our College of Technology, Engineering, and Management. This organization, staffed by a director and project managers, assists between 200 to 250 companies annually in identifying and addressing manufacturing issues. We also have other centers that aid in product design, quality assurance programs, and food packaging assistance.

Providing this service has created strong partnerships resulting in significant gifts-in-kind, scholarship money for students, and fiscal assistance for faculty development. We developed a partnership with Hewlett Packard/Compaq to lease laptops for our students, an admissions requirement at UW-Stout. Because of this contract, we received a certain percent return to the campus on all purchases of ancillary equipment from the company, money that is used to provide scholarships. We also have a contract with Hewlett Packard to provide training for other universities or colleges adopting a laptop program for instruction.

While this cannot replace the loss of state dollars, it does assist the campus in very positive ways.

**ACUTA:** How does the highest level of administration—who are ultimately responsible for the bottom line—effectively keep watch on the college purse? When major purchases are needed for change, renewal, restructuring, updating, and more, what lines of communication make it possible to approve those decisions with confidence? What are ways that these lines could be strengthened?

**Sorensen:** We have clear lines of communication on all matters, and I meet with the vice chancellor (the chief budget officer) weekly, and, if needed, there is update on the budget at that time. We also have weekly, informal "issues" meetings with the provost and the chief information officer where fiscal issues are discussed. The Chancellor's Advisory Council (CAC), a 20-member committee representing each constituency group on campus, meets biweekly, and we normally have
budget and fiscal issues on the table at those meetings. We have a fluid, dynamic budget that we monitor carefully at all times.

We have introduced at UW-Stout a very effective process for both short- and long-term planning and setting priorities. Each fall, nine facilitated group sessions are held where we listen to what the faculty, staff, and students see as critical needs; analyze the categories that emerge from these; and, at a retreat with the CAC and additional faculty and staff, members identify and fund critical priorities. This process is deliberate, detailed, and timely. Major decisions have emerged including our commitment to a totally digital campus, a robust infrastructure to support it, the decision to require laptops for all students, and many others. During this process, governance representatives are engaged in the discussions, and we always take the identified priorities back through the governance structure. We also have a university special projects account for unanticipated issues that always appear during the year. When major decisions are made, they have been thoroughly reviewed by campus.

This approach is continually assessed to identify what can be strengthened. Each listening session is evaluated, the retreat is evaluated, and we find that making small adjustments to the process has kept it efficient and effective.

ACUTA: As funding gets tighter, cooperation between higher education institutions becomes a valuable way of leveraging resources. Describe some of the ways that Stout has benefited from your cooperative program with the Wisconsin technical colleges.

Sorensen: Historically, UW-Stout has always worked closely with the technical colleges, accepting transfer students, accepting credits earned at technical colleges more readily than most other universities, and providing degree completion programs on their campuses. Over the past decade, this relationship has been strengthened in significant ways. Working with a high school and a technical college in southeast Wisconsin, for example, we jointly developed the first 2+2+2 program in the state where a student could take a high school track of courses, transfer to the technical college, and then complete the degree program on site with no loss of credit. We actually assigned a faculty member to a full-time position there to assist in developing the curriculum. Five technical colleges in northwest Wisconsin are partners with the Northwest Manufacturing Outreach.

Center, our federally funded technology transfer organization, so the pool of experts is expanded to serve the private sector. We just recently hired an individual to work as a field coordinator with the technical colleges to identify and facilitate transfers to UW-Stout, identifying a large pool of potential students for this university.

We benefit from this partnership in many ways. First, the talented staff at these institutions allow us greater flexibility in serving the manufacturing needs of northwest Wisconsin. Second, there is a much larger pool of potential students for our programs as we market more effectively, and their campuses are excellent sites for our degree completion effort. Finally, we tap into the expertise of their well-qualified faculty to teach specialized
courses for us, alleviating the need to rely only on our campus-based staff.

ACUTA: Stout has a reputation for excellence in technology, and it was one of the areas that you highlighted in your Focus 2010. Please share with our readers your strategy in gaining national prominence in this very competitive area.

Sorensen: We actually had a very simple strategy to gain recognition in the area of technology; we believed that this was essential for the future growth of the university and made a strong commitment to achieve that end. UW-Stout has always been known as a university that was heavily engaged in the use of technology. In our 1997 planning process, we identified the need to develop a state-of-the-art infrastructure if we were serious about the future. Within six months following the decision, a strong, robust network was installed. By 1999 we had developed three pilot programs in what became our e-Scholar (laptop) program, and today UW-Stout is a totally digital campus. We are a wireless campus: All classrooms are wired and nearly 90 percent of general classrooms are mediated. Three full-time Web designers, a training lab endowed at well over $2 million, and a cost-share program that provides a new computer to all faculty and staff every three years demonstrate our ongoing commitment.

Our technology advantage goes well beyond digital technology as we have an aggressive program to assure that our science labs, packaging labs, food science and dietetics labs, and all labs are as modern and up-to-date as possible.

Again, planning, commitment and aligning our budget with our priorities has allowed us to achieve this level of success.

ACUTA: For a school that might want to implement the kind of changes that lead to the Malcolm Baldridge Award, where would you recommend they begin? What were the first steps UW Stout took?

Sorensen: The Malcolm Baldridge National Quality Program is a very comprehensive approach to analyzing the entire organization; and the greatest strength of the program is that it enables you to see every aspect of the institution. To begin the process an organization should write the application, a time consuming task; and I suggest that a consultant who knows and understands the criteria and the language would be useful. Many organizations are unwilling to complete the application before every issue has been addressed, but I think that is a mistake. There are no perfect organizations, and the process of writing the application, submitting it to a state quality award program (they are all based on the Baldridge criteria), or to the national program is invaluable because the feedback report that an organization receives is an excellent guide to address the strengths of an institution, as well as the opportunities for improvement.

We were fortunate because we had an alum who knew the criteria, had experience as an examiner, and was willing to spend a day discussing the program with our leadership team. We submitted two applications before we were awarded the Baldridge award, and used the feedback reports each year to address issues identified by the examiners.

My advice—write the application and submit it!

ACUTA: What are the most significant campus benefits of award programs such as the Baldridge Award? Did you experience any unexpected benefits from participating in the competition? Are there any negative outcomes from such a process?

Sorensen: I would comment on several benefits of receiving the award. The first is simply the national and international recognition that follows the award. Since 2001, we have hosted or visited colleges or universities from 44 states and nine countries. We established a Center for Continuous Improvement and Assessment, and in 2005 we were still providing consulting services for institutions of higher education as well as health care organizations. Our publications include a book, a book chapter, several articles, and there are commitments for the future. Most state universities are not well known outside the state or region (no matter what the president or chancellor may say!) and this award does bring a new distinction and recognition to a university that, in my opinion, could not be accomplished in any other way. A second benefit is the pride it creates on campus among faculty, staff and students, even among those that were critics of the award and our decision to apply for it. We purchased lapel pins of the Baldridge logo for every employee and yet today many still wear them daily.

However, the most important impact is on how we think, plan, and behave on campus. We think and behave in a very proactive way; we use data and data analysis daily; our planning process is inclusive, open, and looks to the future. We benchmark ourselves against some of the best state universities in the country, and benchmark some of our processes against organizations in the private sector. We ask tough, difficult questions about our organization and analyze carefully when we see a negative trend in our data.

In a nutshell, this award, the process of achieving the award, and the continued examination of criteria have changed the very culture of UW-Stout in very positive ways.

ACUTA extends our gratitude to Dr. Sorensen for taking time to share his insights and experience. Visit the UW Stout campus at http://www.uwstout.edu.
Merging Faces of Telecom Service Providers

by Paul Korzeniowski

The mighty have fallen in the telecommunications industry. At one time, AT&T and MCI were the industry’s most influential service providers. These carriers established market positions that were so great that the FCC blocked each company’s attempt to expand its business because the government feared such aggressive moves would weaken competition. In 1996, AT&T wanted to purchase SBC, but FCC Chairman Reed Hundt labeled the merger “unthinkable.” In 2000, the government agency blocked MCI’s proposed purchase of Sprint for similar reasons.

Early in 2006, a much different picture has emerged. “Revenue and profit margins have been rapidly shifting throughout the telecommunications market, and unfortunately AT&T and MCI did not keep pace with the changes,” said Victor Schnee, president of Probe Financial Associates Inc. As a result, AT&T is now part of SBC Communications which has taken the name AT&T, and MCI has been acquired by Verizon Communications Inc.

These moves underscore dramatic changes that have taken place in the telecommunications industry since the passing of the 1996 Telecommunications Act (a major update to the Communications Act of 1934.) The Telecommunications Act opened up opportunities for new providers, the dotcom boom sparked the creation of a bevy of new service suppliers, and the dotcom bust drove most of them out of business. Its ripple effect is still being felt.

Consequently, communications managers find themselves in a precarious position. They are no longer sure that their strategic partners will be in business in a few years. “Who would have thought that AT&T would ever be acquired?” noted Sandra Roberts, director of telecom at Wellesley College. “All of those grandmothers were raised to hold onto their AT&T blue chip stock because it would eventually make them rich.”

With key suppliers being acquired, communications managers are having difficulty determining which steps to take to make sure they can deliver quality telecommunications service to their users. “The ongoing market consolidation means there are fewer well established carriers that cater to the business user,” said Robert Corbin, director of telephone systems at Ohio State University.

What are the reasons for the market changes and what is their impact? AT&T and MCI built their business by delivering long-distance wireline service to business and residential customers, which once represented the marketplace’s sweet spot. However, technical advances, increased competition, and regulatory changes have led to market shifts, so those services are no longer as lucrative as they once were. As a result, the level of service delivered to academic institutions has fallen.

Service Alternatives

The changes started with the Telecommunications Act of 1996, which enabled local exchange carriers (LECs) to move into the long-distance market. “LECs benefited from the FCC changes: They have been winning 20 to 30 percent of the long-distance business,” said David Willis, a senior analyst with Gartner.

As part of that government act, long-distance companies were also allowed to deliver local service, but they did not fare well there. “The long-distance companies never really developed the right strategies to attract local customers,” said Dan Baker, director of OSS research at market research firm Dittberner Associates.
Regulatory issues also played a role in the lack of success: "The cards were stacked against the long-distance carriers; they had to pay so much for local access that it became difficult for them to match the rates and provide the level of service that the local carriers offered," noted Willis.

Competition from newer players caused long-distance rates to fall, thus reducing profit margins. This was particularly challenging for AT&T with its substantial bureaucracy developed during the days that it was virtually a monopoly. As a result of the reduced margins, all service providers reduced customer service to stay competitive, making it more difficult for business customers to work with the provider. The reduced rates also made it more difficult for colleges and universities to stay competitive in the student long-distance resale business. Students were able to purchase prepaid long distance at rates lower than the the universities were able to offer. As a result, university telecom charges have dropped: "We deliver about 30 percent as much revenue to our telecom service provider now as we did five years ago," noted Robert Mays, director of networking communications at Villanova University.

Wireless networks have become more popular and further eroded wireline revenue. When students had to rely on university phone services, academic telecom managers could still bring in revenue from monthly phone charges. Increasingly, students have abandoned wireline phones in favor of wireless ones that are cheaper and easier to carry. This has resulted in a growing trend to remove wireline phones from residence halls all together.

The Internet also provided businesses and consumers with new alternatives. "The emergence of VoIP had a chilling effect on public switched telephone network (PSTN) services," explained Probe Financial's Schnee. VoIP enabled start-up carriers to deliver long-distance voice services at low rates. These calls are not subject to the costly and complex settlement fees found with international PSTN connections, so they quickly ate into carriers' lucrative international calling market. AT&T and MCI revamped their networks to offer these services, but they have been hard pressed to match offerings from start-up vendors such as Level 3 Communications and Vonage, according to Schnee.

Further compounding the problem, cable companies recently became long-distance service suppliers. By bundling local service, long distance, high-speed Internet services, and cable television services, these firms have increased their telecommunications market share, which had been zero.

The increased market competition was not totally unexpected, and the two firms did try to buttress themselves against the changes. AT&T attempted to build a bundled services portfolio by adding cable television, local services, and wireless services to its repertoire. However, the expected synergies did not materialize as quickly as the firm anticipated, and the company ended up selling off those businesses. "As it attempted to position itself for future growth, AT&T did not have strong leadership in top management," stated Schnee.

MCI's leadership was perhaps too strong. The firm was acquired by WorldCom, which became a top service provider via acquisitions. Under pressure to grow revenue during the Internet boom, the company followed some questionable accounting practices. This resulted in the largest bankruptcy in U.S. history and later the conviction of Worldcom CEO Bernard Ebbers for his part in an $11 billion accounting fraud. Worldcom remerged as MCI and as a weakened company from the process.

The end result has been diminishing customer bases and declining profits for the two long-distance services suppliers. AT&T's revenues fell from nearly $50 billion in 1999 to about $25 billion in 2005. MCI's third-quarter 2005 revenue, announced last August, was $4.5 billion, a 12 percent decline from its 2004 sales. Rather than continue to go it alone, the two determined that their best long-term strategy was to be acquired.

Quality Service

While the ripple effect from acquisitions touches a number of market segments, the impact may be felt most by academic telecommunications departments. "AT&T and MCI built their business mainly by delivering services to business customers," said Schnee. "The local exchange carriers and cable telephone suppliers have focused more on the consumer market. The market changes leave business customers with the question: Where can they find quality service?"

In some cases, academic institutions had been searching for an answer to that question, too. "We had been a long-time AT&T customer but felt the company's service had been slipping and switched service providers about five or six years ago," noted Wellesley College's Roberts.

Declining service has become an all-too-familiar lament among academic telecom managers. "As telcos have tried to cut operating costs, it seems like each employee is trying to do three people's jobs," said Michael Zinkus, director of systems and network services at Framingham State University. "There is no doubt they are trying to take care of their customers, but they do seem to need more manpower to accomplish that goal."

Ideally, the mergers may solidify AT&T's and MCI's customer service. The companies are now on stronger financial ground: With annual revenue near $72 billion, SBC (now AT&T) and Verizon have been jockeying for the position as the nation's largest carrier. With their financial questions rendered moot, AT&T and MCI could focus more
on delivering services to their customers and less on trying to develop viable long-term business plans.

Another potential plus is that the companies could emerge with more compelling service lines. "The mergers do have the potential to marry AT&T's and MCI's long-distance services with the local presence evident with Verizon and SBC," said Gartner's Willis. "It may be quite synergistic."

AT&T has maintained a cordial relationship with SBC since the failed merger in 1996. The two worked together so that Cingular could purchase AT&T Wireless in 2004. SBC has proven it can deftly manage large, complex acquisitions: The firm acquired Pacific Telesis Group in 1997 and Ameritech in 1999.

For MCI, the company gains a much needed entry into the wireless market, an area where it had struggled to gain a foothold. Verizon/MCI has also pledged to invest $2 billion in capital equipment to upgrade its network facilities and deliver more services to customers.

On the Other Hand

There are also some potential downsides with the acquisitions. Mergers are long, drawn-out affairs. The federal government must approve, and then they still must be approved by independent state regulators. Even when there do not seem to be any hurdles, the approval process slows down the firms’ integration efforts and delays them from working together.

These mergers were driven largely by Wall Street, and one of the goals is to increase profitability, something possible if the carriers reduce their operating expenses by cutting redundant functions. SBC has already stated it expects a workforce reduction of 13,000; Verizon has not yet outlined its plans. This may not help academic telecommunications managers. "It stands to reason that if a company has fewer employees, then its customer service will suffer," said Ohio State's Corbin.

Another issue is that anticipated cost reductions may not be achieved. "Vendors have repeatedly talked about consolidating their billing systems, but they have often abandoned such projects because the systems are so large and complex," said Dittberner Associates' Baker.

How well the new companies sync up is unclear. These firms will need to revamp their business processes and determine how they want to deal with corporate and consumer customers. Employees from the old and new firms will be vying to keep their processes—as well as their jobs—intact. The job cuts could mean service will suffer and long-standing relationships may be broken.

Analysts think the SBC/AT&T and Verizon/MCI mergers foreshadow additional consolidation among service provid-

ers, who have lost more than $2 trillion in stock value since the peak of the dotcom boom. "I don't expect all of the existing telecommunications companies to stay in business as stand-alone entities," predicted Probe Financial's Schnee.

Broadwing Communications LLC, Global Crossing, Level 3, Sprint, XO Communications Inc., and WiTel Communications LLC are some of the firms still focused on the business market. Already, BellSouth Corp. has been mentioned as a possible suitor for Sprint. Qwest Communications International Inc., which made an unsuccessful bid for MCI, has been rumored to be headed for a change.

"We've been hearing for at least five years that Qwest was going to be acquired or go bankrupt," said Wellesley College's Roberts. "While I am concerned about a potential change, it is not something that I fret about constantly."

A smaller pool of telecommunications service providers could lead to higher prices for business. "There is the law of supply and demand, and if there are fewer firms competing, then there is more of a possibility that carriers may feel less inclined to lower pricing," said Gartner's Willis.

Because of the uncertainty, telecommunications managers are becoming proactive—and maybe even a little defensive—in dealing with telecommunications services providers. Increasingly, academic institutions are including standard provisions in their major contracts that can protect them if unforeseen market changes occur. Most contracts include service level guarantees, and smart managers include clauses that raise the expectations or accelerate the penalties in case an unforeseen change, such as a merger, occurs with a service provider.

Academic institutions are also signing shorter term deals. "A few years ago, five-year deals were common, and almost all of our deals covered at least three years," said Ohio State's Corbin. "Lately, we've signed a few three-year deals but are focusing on agreements that are up after one year in order to protect ourselves."

Final Thoughts

Higher prices, poorer services, and shorter deals were not the goals when the FCC decided to overhaul the telecommunications market 20 years ago. "The government broke AT&T apart to enhance competition, but deregulation seems to be pulling the company back together," concluded Corbin.

Indeed, the telecom market is shifting toward a monopolistic model where a few large, consumer-focused service providers dominate the market, and academic telecom managers struggle to find quality service.

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How Three Schools Make Profitable Use of the Web

by Curt Harler

For a mere $100,000, Ashland University in Ohio developed a website that promises to return its investment in about a year and could enable the school to bring in some major alumni contributors.

Ashland University’s Ashland Universe is the nation’s first three-dimensional, interactive college campus.

“We’re having a ball with it,” says Carl Gerbasi, vice president of enrollment management and financial aid for Ashland. “As far as we know, no other institution is using avatars the way we are,” he adds.

Ashland’s Avatars

It is easy for the Ashland staff to be enthusiastic when a project is gaining acclaim from students, administration, and alumni. Many people might like to take credit for the project, but it actually came about accidentally.

“We were redoing all of our literature,” Gerbasi recalls. They were working with a local Ashland firm called Red Red Design (www.redreddesign.com). One of the designers—described by those who are close to him as “a real geek”—asked why the school was designing paper literature. He talked about avatars and virtual reality.

An avatar (or AV) is an icon or representation of a user in a virtual reality program. AVs can be used in graphical, real-time chat applications to make the virtual experience more user-friendly. Some AVs are graphical personifications of a computer or a building.

Ashland people show up in the program wearing purple shirts with an A on the back. The rest of the campus looks...well, just like the campus.

“This is geared at the 15- to 22-year-old market,” Gerbasi explains.

The Ashland folks were fascinated. The designers set up a dummy that represented a small fraction of the campus. But information technology, admissions, and administrative personnel were uniform in their fascination with the project.

In mid-2004, Red Red got approval to roll out the project covering all areas of the campus. And the administration got to thinking about uses for the project.

Red Red calls the technology they use 3Dmersion. “We had been developing the technology blend for another client to allow them to do chat with other avatars,” says Doug Cooper, development director. With clients like Mac Tool and Rubbermaid, the original goal was commercial. However, they saw the possibility to port the technology to Ashland.
"We made a proposal that acknowledged that print is somewhat effective but that the Web is the way to go," Cooper says. Red Red offered to do a demo. They developed a beta version in the school's quad area. Ashland's staff came in, tried it out, and fell in love with walking around as avatars. Ashland agreed to go ahead with the project.

The project was turned up in mid-April, 2005. In the Ashland community it was a big, big deal.

Note that the e-mail address has Ashland "Universe" and not "University." That's a small but important clue to the idea that the whole universe at Ashland is available to the visitor who wants to get to know the campus.

Admissions and Beyond

Ashland continues to look at expanding the program and may include its bookstore. While the obvious outreach focus is admissions, Gerbasi says there are many uses beyond the introductory campus tour and many uses in other areas.

They plan to set up a scavenger hunt for students. As students tour the site, they "pick up" various icons from different buildings. Those who complete the tour get a coupon redeemable at the campus bookstore.

Cooper proposed a number of other programs. One would offer seasonal tie-ins. The City of Ashland hosts an annual hot-air balloon festival. It would be simple enough to add a balloon's eye view of campus and have a balloon fly through the campus. That is still pending.

A click on any building will bring up a window showing the history of that building or talk about the legend of the school's mascot eagle.

"This has far wider impact with our international students," Gerbasi says. On a small campus like Ashland's, the international component is important for building diversity.

With 150 international students on campus, recruiting at a distance can be challenging. Ashland Universe lets students "walk" the campus from their homes far away. Even better, a prospective Korean student can correspond with Koreans on campus; a prospective Japanese student can meet other Japanese on campus.

The conversations are conducted in real time, and there is reduced need to print up highly specific literature.

"We're looking at this to save us a lot," Gerbasi says, adding that postage costs keep increasing.

Even better is the impact the virtual tour can have on alumni. Prior to reunions, for example, alums can take a tour of the latest developments on campus. There are two new buildings and a new wing that show up on the site.

Better yet, architect's drawings of planned buildings can easily be dropped into the program. "Your name

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UT Markets and Sells on the Web

Another Web application is direct marketing of merchandise. The University of Texas at Austin's TXShop was recognized with the Institutional Excellence in Communications Technology Award at ACUTA's 34th annual conference last year.

While marketing a school is one good use for the Web, selling products and services is another. The University of Texas at Austin's TXShop works with the school's Division of Housing and Food Services (DHFS) to offer a myriad of products to students and alumni.

TXShop kicked off in 2002 with Version 2.0, offering gift baskets, balloons, and Bevo Bucks to students living in campus housing.

Now in Version 3.0, TXShop offers administrators of departmental stores a suite of administrative and technical support. The program has expanded to allow alumni, staff, and the general public to get on the Web and purchase goods. More important, to the internal community, it lets departments market and sell their products and services to a very wide audience.

For more information on how TXShop uses the Web to reach out across campus and beyond, see the ACUTA Journal of Communications Technology in Higher Education, Fall 2005, pages 39-42.
would look really good on our new building," Gerbasi pitches. "For a single $10 million donation, we can name it for you." A single such contribution would cost-justify the website for a long, long time, but it is not the home-run ball that Gerbasi is after. He would prefer to see a lot of smaller, but key, programs turning up on the site.

Like many other colleges, Ashland hosts nonuniversity activities. One of the big ones at Ashland is called Buckeye Girls State. It brings in 1,000-1,200 selected high-school girls who set up their own government and learn a great deal about politics.

Not only does Ashland Universe give the kids a preview of the campus (much as it would for an incoming student), but it also served as the hosting mechanism for a reunion held recently.

Websites can prove profitable in more difficult situations, as Tulane University in New Orleans found out when Hurricane Katrina blew through last fall. Katrina hit at an awful time, the start of a new term, a new school year. However, Tulane's staff was prepared.

"We have an emergency website set up outside the Tulane site," explains Rachel Hoormann, director of Tulane's Web communications. The site usually shows disaster preparedness and other related information. However, when Katrina's full force hit New Orleans, all of the school's main Internet connectivity was washed away.

Around Tulane's campus, storms are not news. Long ago, the school cut a deal with a multilocation commercial ISP provider to provide backup service for disaster recovery.

"Normally, what we do when there is a storm in the Gulf is to monitor the situation for the community," Hoormann says. The site, based on the school's weather service, updates the community about the situation.

Early on, Katrina was expected to hit Florida. So there was little time between the serious hurricane warning and the time Katrina hit. "When Katrina started tracking West, we went on full alert," Hoormann says.

From that moment until October, when the regular Web system came back on line, Tulane was in strict emergency mode. Hoormann can't imagine what would have happened if the backup site had not been in place. "It was essential," she says. "It wasn't until January 1 that we switched off of the Katrina-specific site."

As with any situation, Tulane learned a lot from the extended stint without its prime site.

"We are looking at ways to do it better," Hoormann says. "You have to be sure your backup service is robust enough to handle the traffic it will take."

The backup site literally became Tulane's only outlet to the outside world. Phone service was dead. Even the U.S. Mail was not reliable—and certainly not expected to provide the instant communications needed in such a situation.

Hoormann admits that they have no idea how many hits they had on the backup site. "The provider does not keep logs over a month," she said. Ordinarily, the logs would have been of great interest, but there was just too much going on for her to deal with statistics. However, she knows there were a lot of hits.

That leads to one thing she will do differently next time. "We had some technical issues," she says. For instance the traffic on the backup site was so dense that the log file began to cannibalize vital storage space.

There were three separate areas on the site: student, faculty, and staff. Students were desperate for information on such things as orientation, tuition payment, and how to handle room fees at the other schools that offered to allow them to continue their studies in drier places.

Tulane eventually set up phone banks. LiveWorld gave them capability to do live chat interactions with everyone from the university president on down the line. The University of Houston volunteered to host audio messages for Tulane on its system. "Ours didn't have the multimedia capability we needed," Hoormann notes.

She has no doubt that the website was priceless in keeping the Tulane community together. "The key is to communicate early and often," Hoormann says. Messages were changed on the website several times daily.

Her focus today is on the future. "We want to make sure our systems are up and running, that the Web is available 100 percent of the time, that we eliminate downtime...even when we are down."

Tulane Turns to the Web in Katrina's Wake
"The website got a good response," Gerbasi says.

**How It Works**

The easiest way to demonstrate the program is to see it through the eyes of a typical high school senior who is considering Ashland but is not sure whether it is worth skipping band practice or student council meetings (or spending $2.40 a gallon on gas) to see the campus.

That prospective student gets an e-mail like this one: “Hello Deborah, Explore Ashland University in a new way, right from your home!”

That eliminates any need for a car or cornering Mom or Dad for a midweek drive for a first look at the campus.

The student is offered the link to the website: www.ashlanduniverse.com. In some early e-mail offerings, the site appeared to the student as www.ashlanduniverse.comrichmediaemail.htm, and, if simply cut and pasted into a browser, that would not link to the site.

“Chat with your friends, meet new ones, and make yourself at home at AU,” the personalized invitation reads. “Explore AU like nowhere else!”

Computer requirements at the student’s end are fairly simple. The page requires a 600 MHz Pentium III or G4 or better processor, 32 meg video card, 256 MB of RAM, and Macromedia Shockwave 10.1. A broadband connection—either via cable modem, LAN, or DSL—also is necessary.

Students who follow the link are immersed in a 3-D, interactive representation of the Ashland campus. For readers without handy Web access to check out the site, think along the lines of Google Earth.

“You’ll move around campus via your own avatar,” the site promises. And it delivers.

From both the university’s and the student’s points of view (as well as their parents’), the good news is that Ashland Universe is always open, 24/7. That means students can poke around at any time.

The site has both seasonal changes and time-of-day changes. So, a student who logs on at night will experience a nighttime campus (lighting is available).

There are a number of “Easter Eggs” planted in the program. Hint: Walk into a corner of most of the buildings and you’ll find yourself transported to the roof, where you can see all around.

“There are all kinds of things we can do to spice up the site,” Gerbasi says.

**Administrative Angles**

The cost of Ashland’s site was $107,000, which was budgeted over three years.

As the person in charge of enrollment, Gerbasi is well aware of the hundreds of thousands of dollars the school spends on paper, printing, and postage to attract students to campus. While he expects a one-year payback, Gerbasi says that it is the savings over the long term that will be substantial.

“It took us a year to put it together—and we went right up to the deadline,” he says. “We wanted to roll it out April 10, and on April 9 we were still working on it.”

Ashland Universe worked well at its debut. Gerbasi notes that they still are adding to it.

The program can handle up to 75 people at one time. “This is part of our rich media campaign,” he continues.

One remaining challenge is to get the faculty to come up with more uses. He hopes to see the biology department reserving the system from 8-10 p.m. or the English department meeting on the site at a regular time—either with prospective students or with authors and alumni.

The system is designed to be instantly adjustable. Should someone on the site become abusive, it can be handled immediately. To date, Gerbasi says, there have been no problems. But it is always good to have safeguards.

A “dashboard” documents all conversations. This is particularly handy should someone want to go back in the record and confirm the amount of financial aid offered or verify the times of a meeting.

“We’ve had no issues or concerns yet,” Gerbasi says. “But we have had people come back to the same site to review or confirm information.”

The dashboard also can track workers’ time on the system—for example, a student paid to chat with potential new students. Anyone with dashboard authority can “smite” (or ban) an abusive user.

“The biggest selling point of this kind of system is that it is really flexible in different venues,” Cooper says.

He sees a day when the university can tie in visits by rock bands, politicians, or celebrities to the chat capability. All campus guests would be able to appear as avatars and chat online with students and members of the community or fan clubs.

“We could add dozens more features,” Cooper says. “The only limit is our creativity and their funding.”

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Developing Accounting and Planning Systems to Control Network Costs

by Scott Sheavly
Cornell University

Cornell University: A Visionary’s Legacy

1843: Ezra Cornell, working under contract for Samuel F. B. Morse, built the first pipe-enclosed underground telegraph line connecting New York and Washington. After partially completing the underground line, Cornell determined that stringing wires on glass-insulated poles would be more effective.

1844: Cornell built an overhead line between Baltimore and Washington.

1855: Cornell helped form a company that later became known as Western Union Telegraph Company.

1865: Using $500,000 of his own money ($7 million in today’s dollars), Cornell established Cornell University. For its location, he chose his own 210 acres of farmland, a rural western-facing hillside in central New York with a spectacular view of Cayuga Lake.

2006: Cornell’s vision of an institution where one could study in any discipline continues to be foundation of the university’s educational philosophy today. Cornell University’s original 40,000 square feet of space in Ithaca, New York, has grown into a sprawling 750-building campus with more than 15 million square feet. Despite its geographic isolation, enrollment has grown from its first class of 412 to nearly 20,000 students taught by nearly 3,000 world-class researchers and scholars.

As anyone involved with telecommunications is well aware, meeting the technical demands to support continuous increases in bandwidth demand and staying abreast of emerging voice technologies are challenging and daunting tasks. Meeting the technical challenges is not enough. Technology professionals must also develop effective mechanisms for tracking costs and finding creative solutions for funding and tracking ongoing costs and new technology initiatives. We must continuously think and plan for the long term, as well as find ways to control costs. It is essential that our accounting and funding mechanisms be simple and explainable so that we can readily adapt to new technologies and simultaneously manage costs effectively.

To meet these challenges, Cornell University developed a four-step approach that reflects several years of analysis and refinement:

1. “Sorting of the Beans”

2. Determining costs of the services we provide

3. Rationalizing a long-term funding model

4. Establishing an ongoing review process with “open books”

“Sorting of the Beans”

For years, Cornell captured the costs of its voice and data network in one cost pool. This approach worked well during an era when cell phones...
and e-mail were in their infancy or nonexistent and the university had a virtual monopoly on long-distance service. When the data network began to grow in leaps and bounds, there was plenty of money to pay for network expansion.

Then Cornell, like other universities, observed a steady decline in long-distance income during the late 1990s. At the same time, the university’s telephone switch needed replacement, e-mail became ubiquitous, bandwidth consumption was growing exponentially, and demand for wireless data connectivity began to blossom. Campus customers were complaining about the high cost of voice and data while simultaneously demanding more and more services.

The first step in sorting out the costs was to establish a theory for assigning costs.

At Cornell, we live by the principle of assigning costs to “cost causer.” That is, we do our best to align costs as closely as we can to the services we provide. Departments that consume more network resources should pay more for those resources. Costs for bandwidth are assigned to Internet services, and departments that use more bandwidth pay more for Internet services. Likewise, costs of the telephone switch are assigned to telephones, and users of digital phone services pay more than users of analog phone service.

Before we could understand what the costs of our services were, we needed to create tracking mechanisms to account for costs. We broke our costs into three major categories:

- Costs that can be directly attributed to the data network. The expenses in this category include routers, switches, access points, Internet connectivity costs, network maintenance, and the cost for the engineers and technical staff that manage the data network.
- Costs that can be directly attributed to the voice network. The expenses in this category include the phone switch and upgrades, long-distance usage and trunking, voicemail, maintenance, and again, the cost for the engineers and technical staff that manage the voice network.
- Costs that can be attributed to both the voice and data network. These costs might include general maintenance of the campus backbone, utilities costs of the node rooms, the network operations center, billing, customer service, and general management costs (such as administration, project management, and inventory management).

As Figure 1 illustrates, as the costs on the pyramid go from top to bottom, the costs are more directly identifiable to services provided. For example, Internet connectivity costs would be a direct cost of the Internet service. Billing is an indirect cost of Internet connectivity.

We created a unique account in the university general ledger based on our cost categories. Accordingly, each invoice we pay is assigned to a unique account. We establish our budgets by each category and report monthly on the costs of each category.

Determining the Cost of Each Service

Once the costs are sorted into the categories by service, the next step was to determine the cost of each service. At Cornell, the primary services provided include the following:

- Analog phone service
- Digital phone service
- Voicemail
- Network ports (local area network)
- Network infrastructure (campus area network)
- Internet (wide area network)
- Moves, adds, and changes

Before we could determine the full cost of each service, we had to find a sensible way to allocate costs that can be attributed to both voice and data services (at the top of the pyramid) to the costs that can be directly attributable to voice and data services (at the bottom of the pyramid). Cost allocation is not a science. There is no single way to allocate costs, but there are ways that make more sense and can be rationalized more easily. In collaboration with university controllers’ staff, we developed a simple approach for allocating costs to services, illustrated in Figure 2 (on page 40).
Once the allocation is complete, the total cost of the service is determined by adding the directly attributable costs to the indirectly attributable costs. Rates are calculated by simply dividing the total cost by the number of units.

**Rationalizing the Funding Model**

Once we understood the costs of our services, we needed to rationalize our funding model for voice and data services. From the voice perspective, desktop phones, voicemail, and long-distance rates are cost based, and there was not much controversy.

In 2002, the story with respect to data was much different. Bandwidth consumption was increasing exponentially, and we had a high cost for a single port, which was encouraging a proliferation of hublets. We had two OC-3s serving campus that were nearing capacity. To address these issues, we formed a campuswide task force, including a cross section of stakeholders from academic and research departments and central financial organizations. The task force recommendation was to create a network rate structure consisting of three components for academic and administrative departments:

1. A port fee inexpensive enough to encourage departments to discontinue the use of hublets.
2. A central allocation from the university to fund network infrastructure, data ports in public spaces and labs, and the growing wireless network. On the Cornell campus, the wireless network is deemed to be supplemental to the wired network.
3. A wide area network chargeback consisting of two components: a very low IP fee for usage up to 2 GB, and a per megabyte fee for usage exceeding 2 GB. Usage up to 2 GB was intended to cover usage for 90 to 95 percent of all users, which has held true. In fiscal year 2007, we will be raising the usage threshold to 5 GB.

For the more than 6,000 students that live on campus, the port fee, the residence hall share of the network infrastructure, and the IP fee are rolled into their room rates. We recover the costs through a chargeback to Campus Life. Like academic and administrative users, students in the dorms pay for usage exceeding 2 GB.

The new rate structure was implemented on July 1, 2003. Despite some initial opposition, the vast majority of departments have been satisfied, probably because their total costs have gone down. With the exception of students who may have received one outrageously high bill (which may have been waived through an appeals process), there has not been much dissent. According to Polley McClure, Cornell’s vice president of information technology, “Development of the network-usage-based billing model and rethinking the basis for cost recovery for the data network was a tremendous accomplishment. The port-charging mechanism didn’t provide the proper incentives to encourage behavior consistent with the overall strategic goals and culture of the institution.”

The first year we implemented network-usage-based billing, we realized a 65 percent decrease in off-campus student traffic, while academic and administrative off-campus traffic remained flat. We have been able to handle wide area network traffic on the equivalent of two OC3s, and the resulting savings have been tremendous. As a side benefit, now that departments are paying much more attention to usage, they notice when machines are compromised by security breaches.

Figures 3 and 4 (page 41) show how network usage changed upon implementation in fiscal year 2004.

**Establishing an Annual Review Process**

Each year, we project voice and data costs on a three-year rolling average. In addition, we determine rates for the subsequent fiscal year. We then present these costs and rates to a university executive budget group for their review and approval.

Presenting our network costs and rates to an outside authority each year has instilled a strong sense of accountability for managing costs. Managers and engineers are compelled to think proactively about market forces and the impact our costs will ultimately have.
on the lives of students and the ability for departments to perform research. Five years ago, a $200,000 switch upgrade was solely a technology enhancement. Now a $200,000 switch upgrade is not only a technology enhancement, but also an increase in a departmental monthly rate for a data port of 50 cents.

The results have been well received. While the number of network ports and phones has continued to increase, our total costs have stabilized. Rates for services have remained flat or declined, and complaints from customers have waned.

The Future

Usage of campus-provided phone service has declined dramatically, but cell-phone service in the dorms is unreliable. With a resident population of nearly 3,000 international students, demand for traditional land lines still exists. How can we cost-effectively implement voice over IP? How will soft phone service be used by students?

Similarly, data services are continuously changing. Newer generations of students will continue to demand more bandwidth. Faculty will continue to require more high-speed bandwidth capacity to carry out research and compete for research grants. Ubiquitous wireless service is becoming an expectation by everyone.

We can be certain that demand for network services will grow and become increasingly complex. "The current generation of students processes information differently from the current generation of faculty and administrators at colleges and universities, and we must adapt quickly to our student/customer needs," says Michael Whalen, Cornell's director of planning information and analysis. "The convergence of voice, data, and video services of the iPod generation, that students take for a given, will pose a major challenge for these institutions in the coming years."

Just as Ezra Cornell was faced with the challenges of improving the quality of telegraph lines to support the growth of the telegraph in the 19th century, the institution he founded is faced with the challenges of meeting the changing demands of new generations of students and faculty in the 21st century. But with innovative thinking, proactive preparation, and the willingness of diverse people to collaborate in the planning process, these challenges are not insurmountable.

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Notes

1 Voice and data services at the Cornell's Weill Medical College in NYC are managed separately from the Ithaca campus. This article refers only to the Ithaca campus.

2 The Avaya G3r switch installed in 2001 was fully paid for in FY05, which is the reason for a significant decrease in costs.

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The growing size and complexity of networks and the services they provide have created new challenges in managing information related to them. These services often require the use of advanced network capabilities such as dynamic VLAN configuration, quality of service, virtual private network, and wireless connectivity. The process of identification, authentication, and authorization (IAA) adds another information management challenge as well. The ability to manage all of this information becomes critical when trying to satisfy modern expectations of ubiquitous network service, quick service request response, and network maintenance. The highly decentralized nature of many research universities also demands a solution that empowers local control while maintaining an institution-wide perspective. The University of Kansas (KU) has taken a unique approach to addressing many of these issues.

The Advanced Network Services Registry (ANSR) is based on network-related information stored and organized in an LDAP directory. Various directory-enabled network applications use this information in support of their services, addressing the network-specific middleware needs of universities and large institutions. ANSR was developed by KU’s networking and telecommunications services (NTS) division of information services, and initially deployed in January 2003. ANSR supports delegated device registration, IP address management, campuswide DHCP service, and automated network connection and configuration information correlation. ANSR is also the foundation for an end-user’s IAA mechanism used with VPN and WLAN access services. Figure 1 shows the logical interactions between the major components of the ANSR environment.

ANSR’s delegated management model allows for departmental support staff (ITs) to manage these network services without central IT involvement. ANSR’s proactive training program and flexible configuration options accommodate the differing needs of university departments. The institution’s vision to leverage middleware by using it to enable advanced network services has led to the success of ANSR at KU.

Goals and Objectives

The primary objective of ANSR is to provide network services as transparently and efficiently as possible. As device mobility has been transformed from a novelty into an end-user expectation, the need for managed dynamic network configurations has grown proportionally. End-user mobility and rapid service activation have become key requirements when designing the support systems for university data networks. Additional challenges include accommodating
individual departmental needs while centrally maintaining and leveraging a consistent infrastructure and service model.

The operational objectives of ANSR focus on creating a highly scalable, flexible, and robust system based on a centralized data model, while also allowing for secure delegated management. The source of information for the network is stored in an LDAP-accessible directory. The data are hosted in replicated directory servers that provide appropriate access controls. Departmental ITIs use their choice of LDAP-compliant browsers to securely connect (via SSL) to the directory service in order to manage their network domain. They may also write programs and scripts to integrate the data with other systems. ANSR is a centrally supported system, with departmental level authority and control over the information on which they rely and for which they are responsible.

The technical objectives of ANSR are to provide a lightweight and flexible design that may be easily extended to support new technologies, to leverage modern middleware best practices and techniques, and to maximize service availability. This includes a 100 percent Java code base driven by an XML bootstrap configuration that retrieves configuration information from the same LDAP directory. That directory contains both network middleware and application configuration information. Protocol processing adapters (e.g., DHCP) were designed to be cooperatively load balanced so that when deployed in a redundant configuration, no single point of failure exists.

Directory-Enabled Data

ANSR is based on best practices developed by the Internet2 Middleware Initiative for directory-enabled IAA systems [1]. ANSR extends this concept through the creation of a network branch of the directory tree and additional directory schema that support the modeling of networked devices and services.

![Diagram of Directory Network Branch](Image)

Figure 2: The Directory Network branch

Figure 2 shows the network branch in KU’s directory tree. (Not all of the sub-branches are shown.) The network branch contains network-related information about connected systems, group memberships, and IAA. Network services such as VPN, WLAN, and DHCP access this information for their configuration and operation. Examples of this information include:

- Device address information (MAC and IP)
- DHCP configuration and usage information
- Device connectivity and operational details
- Inventory and ownership details
- Support staff contact information
- IAA data for VPN and WLAN guest access

Figure 3 shows an example of this information for a given device’s registration in the directory.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ou</td>
<td>example attributes</td>
</tr>
<tr>
<td>cn</td>
<td>networkedDevice</td>
</tr>
<tr>
<td>macAddress</td>
<td>00:01:02:03:04:05</td>
</tr>
<tr>
<td>networkDeviceAddress</td>
<td>192.168.1.253</td>
</tr>
<tr>
<td>dhcpClientStatus</td>
<td>DHCP Offer Accepted</td>
</tr>
<tr>
<td>networkDeviceOperationalSpeed</td>
<td>100Mbps</td>
</tr>
<tr>
<td>networkCircuit</td>
<td>1234</td>
</tr>
<tr>
<td>serialNumber</td>
<td>123456789</td>
</tr>
<tr>
<td>owner</td>
<td>John Smith</td>
</tr>
</tbody>
</table>
| sysAdmin    | sysT Support, ou...
| deviceOS    | MS Windows XP |
| deviceOSRevision | Service Pack 2 |
| deviceRole  | Accounting Group |

ANSR-Based DHCP

The ANSR suite of applications leverages the flexibility of the directory-data storage model and the modularity of the Java code base to facilitate experimentation with and implementation of emerging standards and new features. For example, the ANSR DHCP server agent includes several enhancements, draft RFC extensions, and vendor-specific requirements that would otherwise not have been available with existing DHCP server products. These include:

- Registered pools with rule enforcement
- Recording of unregistered device DHCP attempts
- DHCP relay transformations
- DHCP relay agent information option support
- DHCP lease query for passive authentication
- Vendor-specific option overriding
- DHCP OS fingerprinting

Typical DHCP servers support two modes of address assignment: static and dynamic. A static assignment allows for an IP address to be assigned to a specific MAC address. A dynamic assignment (using a construct known as an open pool) allows for any device to retrieve an IP address from a predefined range.

The ANSR DHCP server also supports two additional pool types: registered and unregistered. Getting an IP address from a registered pool requires that the requesting device first be registered within the directory server, specifying its MAC address and other institutionally required information. Such a registration identifies the device as being part of the
institution's IT infrastructure and enhances network security by preventing unknown (i.e., unregistered) devices from easily booting up on the network.

An unregistered pool allows for the tracking of devices that are not authorized to use the network. When an unregistered device attempts to obtain DHCP information, a record of that attempt is created, allowing the ITs to investigate the unauthorized access. This may be as innocuous as forgetting to register a new printer or as malicious as a DHCP-based IP address exhaustion attack by a rogue device. Allowing for delegated tracking of unknown and unauthorized devices enables ITs to proactively police the subnets they manage.

Additional ANSR DHCP enhancements were made to facilitate expanded information gathering, including a DHCP-based OS fingerprinting technique. These additional features are described in Next-Generation DHCP Deployments [2].

Correlating Related Data

Accepted best practices include the avoidance of manual and duplicate data entry and minimizing the number of data sources that must be accessed to gather pertinent information. For these reasons, network "metadata" is automatically extracted from other databases and entered into the directory. The ANSR correlation engine periodically probes network devices (e.g., routers and switches) to extract MAC and IP addresses and associated connection details (port, slot, module, device, and configuration). Using these data, additional network-related information is then retrieved from databases managed by NTS. All of this information is then automatically correlated with and populated into the directory. This approach empowers the local ITs by giving them access to this information without having to contact a central IT support organization for it.

The combined effect of device registration and the metadata correlation process is that any device may be located by any number of pieces of information, including:

- Location
- Wall or closet jack identifier
- Network circuit number
- Switch port/slot/module
- MAC or IP address
- Owner
- System administrator

This allows for very sophisticated device tracking and querying capabilities that are essential to effective security incident response and network management.

Additional ANSR-Based Functionality

- **Network Visualization Tool.** This tool is a “mapper” that allows ITs to obtain a comprehensive overview of their subnets, including which IP addresses are in use, unused, or utilized by DHCP, and who owns each device. This tool allows for quick visualization of the state of any subnet and can be used proactively for self-audits and address management planning.

- **Service Authorization.** Although the service authorization aspects of ANSR are not unique, they do leverage modern middleware group management techniques. Access to a service is authenticated against a user's campus log-in and is strictly controlled by group membership. Figure 4 shows an example group that authorizes end users for VPN access. A similar technique is used to authorize guest WLAN access.

![Figure 4: Example authorization group](image)

An Expanded View of Convergence

KU’s vision of convergence includes the network media and protocols, the information systems that drive the middleware and network services, and the interaction between central IT and our end users. ANSR is the foundation for a strategy that supports several key initiatives that are part of this wider vision. These include enabling, integrating with, or directly supporting:

- Voice/video over IP
- Multicast address management
- IPv6 address management
- Delegated DNS management for IPv4 and IPv6
- Network admission control system
- Usage-based charging
- Billing system integration

As a middleware “framework,” ANSR can enable a suite of advanced network applications that facilitate a distributed methodology for collaborating with ITs. By allowing them to manage their network configuration information in a consistent way, more sophisticated network information sharing and integration can take place.

Integration with Other Services

ANSR plays a role in supporting KU’s voice and video over IP services. It provides DHCP support and location tracking, as well as the policy-control capability that allows for integration with quality-of-service strategies. ANSR is capable of containing the information to integrate with the Internet2 VidMid initiatives [3] as directory-based infrastructures continue to mature and evolve.

ANSR also integrates with KU’s ResNet Integrated Next-Generation Services (RINGS) system [4]. Applied to on-campus housing student systems, RINGS provides admission
control, quarantine, and release services based on the best practices as espoused and codified by the Internet2 SALSA-netauth working group [5]. RINGS is similar to the popular NETREG, but it has a directory-enabled foundation. ANSR ties into the RINGS network admission control functionality by allowing the assignment of different network configurations based on the status of the student's device. ANSR initially provides a nonroutable IP address, isolating the device and limiting any problems it could cause. The RINGS application then audits and updates the student's device (e.g., installing up-to-date anti-virus software, enabling automatic updates on Microsoft Windows-based systems, and initiating security scans) before it is assigned a routable IP address suitable for general use.

RINGS has had a profoundly positive impact on KU's network stability, which in turn has allowed us to apply resources to providing new network services to students. ANSR is the foundation of the RINGS project and demonstrates integration with network admission control and security enforcement systems.

Promoting ANSR via Open Source

ANSR is a powerful tool in KU's goals of enabling advanced network services, enhancing network security, and expanding customer service. Our experience leads us to believe that this system could similarly benefit other institutions. Keeping that in mind, care was taken to "de-couple" KU site-specific dependencies from the core of the system so that others could easily adapt it to their environment. It was also realized that ANSR would need to be designed to allow for the easy development of site-specific add-ons. This was accomplished by making use of Java and XML and by adhering to strict computer-science precepts in documentation and code reuse. The ANSR software has now been placed into the open source public domain [6]. By doing so, it is hoped that others will adopt it and then enhance the functionality of the system.

Benefits from Using ANSR

- **Improved Network Security.** Real-time knowledge of the who, what, and where of connected devices is critical to the swift location and isolation of network anomalies and attacks.
- **Improved Customer Service.** Using ANSR enables ITss to directly control its services, providing quick turnaround to their local network users. The automated incorporation of metadata information historically unavailable to ITss empowers them to respond more quickly and efficiently to local problems.
- **Advanced Network Service Applications.** Common information in the ANSR schema facilitates the development of advanced network applications, such as campuswide integrated DHCP, student device registration and admission control (RINGS), VPN authorization, and WLAN guest end-user IAA. Potential future applications include network port level end-user authentication/authorization (based on IEEE 802.1x) and the provisioning of QoS and MPLS for converged applications.

ANSR Innovations

ANSR is based on the concepts and best practices developed by the Internet2 Middleware Initiative for directory-enabled IAA systems. Two key innovations/additions to this body of work allowed KU to achieve its goal with ANSR. The first was the realization that the university's central LDAP system could be extended by creating a new network branch of the directory tree. This branch contains information about network-connected devices in a manner similar to the way that EduPerson attributes found in the people branch do for individuals. The second innovation was the codification of a schema to contain network service-related management information. VPN, WLAN, and DHCP services then access this directory for information needed for their configuration and state-dependant operations.

Conclusion

The ANSR project spans many dimensions of IT support within a university environment. Its foundation in Internet2-based initiatives, coupled with an extension of this model to network-related information and services, serves as both a unique deployment and an extensible foundation for a wide variety of service offerings. These provide effective solutions to current and future needs, and also aid in an institution's ability to manage information resources.

The ANSR architecture and implementation will provide KU with a wide variety of benefits and will serve as a model for additional directory-enabled systems. It is a unique design and implementation of traditional services, operating in a production environment to support the daily needs of our IT community.

Notes

1. IT support staff (ITss, a.k.a systems administrators) help their end user(s) with PC, OS, application, and network issues. ITss use (configure) ANSR to provide services to end users.
2. KU maintains a site license to a Windows-based version and provides it to ITss at no charge.

References

1. Internet2 Middleware Initiative (http://middleware.internet2.edu) and Identity and Access Management for Higher Education and Research (http://www.nmii-edit.org/).
3. VidMid-VC (http://middleware.internet2.edu/video/).
4. RINGS (http://www.resnet.ku.edu/opensource/).
5. Internet2 SALSA project (http://security.internet2.edu/salsa/).

Contact Bill Klein, KU's assistant director of networking and telecom services, at klein@ku.edu. Reach John Louis, assistant vice provost and director, NTS, at jlouis@ku.edu.
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level performance, and asset and resource utilization are among the most important measurements.

**Best-Practice Hot Spots**

Aligning telecom’s priorities with overall IT priorities makes sense. While this list is certainly not comprehensive, here are three hot spots for many CIOs.

1. **Business Continuity Planning**

Hurricane Katrina was a lesson in the need for preparedness. Shortly after Katrina devastated New Orleans, Ric Simmons, director of telecom at Louisiana State University (LSU), was ensconced in his office some 80 miles away. He wasn’t there for protection from the wind or waves. He was planning for the deluge of new telecom services that his group would roll out in the days following the disaster.

“We created orders to track our costs, which made the reconciliation phase much easier,” Ric said. “We didn’t have to depend on personnel’s memories or hand-written notes.”

Brian Voss, CIO at LSU, said, “We benefited greatly from the relationships we have built, over many years, with our vendors. In times of crisis, one of the most valuable things is to be able to pick up the phone, say you need help, and have it arrive on the next truck.” Additional information is available at [http://www.lsu.edu/cio](http://www.lsu.edu/cio).

2. **Cost Containment**

Aberdeen Group research reports that 7-12 percent of all telecom invoices contain billing errors. This is not new. However, contrary to common belief, the study found that high-volume, low-dollar invoices represent the greatest opportunity for savings. Statistically, error rates among high-dollar items were the lowest. Electronic systems handle high-volume auditing well. Manual systems don’t.

There is more to telecom expense management than receiving credits for billing errors. To maximize cost containment, you need centralized control over at least 70 percent of all communications costs. The explosion of mobile device usage combined with decentralized approval and purchasing for these devices is creating a cost-containment dilemma. Beware.

A management system capable of providing central control over purchase approval processes, service delivery, asset inventory, and payment authorization provides a high payoff, including (1) end-user accountability through accurate chargeback processes, (2) better decision making based on a comprehensive view of all services and costs, (3) negotiation of better contract terms by comparing your operating statistics with peers, and (4) increased customer satisfaction with service delivery.

3. **Asset Management**

When you look at ITIL, expense management, or service delivery management, all roads lead through an effective asset management system. This is not new, since inventory of assets has long been a part of telecommunications management systems. Knowing what you have, how it’s configured, where it is, who is using it, and how it’s being financed are all important in different ways to expense management, help desk, and service delivery.

**Conclusion**

Lewis Grizzard said it well in the title of one of my favorite books, *It Wasn’t Always Easy, But I Sure Had Fun.* Making BP fun is not only enjoyable, it’s also good management. Even before someone coined the term “best practices,” ACUTA was promoting the sharing of benchmark information and making it fun. I appreciate the opportunity to share my thoughts in the *ACUTA Journal.* Whether you agree or disagree with my advice, I look forward to hearing from you. If you plan to shoot at me, please remember another of Lewis Grizzard’s famous titles, *Shoot Low, Boys — They’re Ridin’ Shetland Ponies.*

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Are You Ready for Best Practices?

by Randy Burns
Compco, Inc.

Where did the term “best practices” (BP) come from anyway? Did consultants replace the drab-sounding term “standard operating procedures” with the more elegant “best practices” so that they could charge a higher hourly rate? Maybe. But the real question remains: Is your organization ready for best practices?

Some organizations have these three positive traits that help to make them “ready” to embrace best-practice thinking:

1. Freedom to Innovate.
   Business Week’s Steve Hamm said it well, “These days business model innovations are just as sexy as technical marvels on slivers of silicon.” BP-ready organizations encourage innovative thinking, which fosters employee ownership. A sense of ownership drives positive change and innovation.

2. Flexibility to Customize.
   Few meaningful results come to us canned or prepackaged. BP-ready organizations seem to find the right balance between standardizing and customizing; they are like the great cook that expertly uses the recipe as a guide and not a rigid absolute. Put simply, they adapt systems and processes to the needs of specific workers and work groups, improving productivity and quality.

3. Power to Execute.
   It is really sad when great ideas die like sparks in a rain storm because of bureaucracy. BP readiness requires the power to execute. To borrow a phrase from Larry the Cable Guy, we have to be able to “GIT’R DONE.”

Not So BP Ready

If the devil is in the details, then BP-ready organizations must have exorcists on staff to avoid two pitfalls that will prevent them from focusing on critical hot spots.

1. Meeting-itis.
   If the statistics reported in a CNN Money survey hold true, for a department of 25 people, ineffective meetings will waste 96 hours every week. That will conservatively cost $150,000 or more annually, not including the opportunity cost. Yet BP implementation requires meetings.

   According to the CEO refresher website, great meetings happen when you design with the end in mind. They offer a number of tips, including how to set your agenda and arrangements based on the type of meeting you are planning, opening the meeting with icebreakers to improve rapport, frequently recapping for consensus, and using minutes to ensure post-meeting follow-up.

2. Not Knowing Where You Are.
   When I first started traveling a lot for Compco, you could give me a map, a compass, and a rental car and I could get you lost in any city in these United States. At first I blamed the directions, but eventually I had to admit it. It was my own shortcoming. I learned that is it very hard to get to where you want to go when you don’t know where you are.

   Organizations are like that, too. We all know that denial is not a river in Egypt but sometimes we don’t act like it. Measurement is an important starting point in knowing where we are. BP-ready organizations measure things, because they know they can’t manage what they don’t measure. When a consultant is involved, they call these measurements key performance indicators (for the same reason consultants use BP instead of SOP). According to CIO surveys, customer satisfaction, service-

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Are you ready for the Digital Generation?

Digital Generation \(\text{\textipa{di-juh-tuhl je-nuh-ray-shun}}\)

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- "It is an awesome opportunity to see what is happening other places. I love meeting and socializing with other colleges to get ideas!"

- "The variety and amount of workshops and the ability to network with other campuses."

- "Learning about changes in the industry and talking with others who have similar jobs."

- "A chance to get out of the office and talk with friends I never would have met if not for ACUTA!"

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