

BUILDING A CAMPUS PORTAL

Building A Campus Portal—A Strategy That Succeeded

Anne Bishop

Wake Forest University

Abstract

In 1997 Wake Forest University began the project of building a suite of personalized web services that is now known as a portal. By July of 1998, we had a fully implemented and successful intranet that delivered almost one hundred personalized, filtered web services to all students, faculty and staff, plus those alumni and parents who applied for a free account. Being on the leading edge of such an effort meant that we discovered on our own what works and what does not, without influence from portal vendors or benefit of advice from our peers at other institutions. This paper discusses successful design and implementation strategies that may be useful to others who are considering a portal solution.

Building A Campus Portal—A Strategy That Succeeded

The term “portal” has become so widely used that its very definition has become a major challenge for institutions that are beginning to discuss whether or not they should have one. Software vendors have developed their own definitions as part of their marketing strategies. Combining observation with experience, I define a portal to be a secure application that provides a single personalized gateway to institutional information and services. The personalization feature sets a portal apart from websites that merely specialize in their focus. Personalization is achieved through requiring authentication, and using information from the university’s data stores to tailor the content uniquely to each individual.

At Wake Forest University, we embarked in 1997 on the project of building an extensive suite of personalized web services. By the time portal vendors began arriving on our doorstep in 1998 and 1999, we already had a fully implemented and successful intranet that delivered almost one hundred personalized, filtered web services to all students, faculty and staff, plus those alumni and parents who applied for a free account. Rather than research and statistics, this chapter contains a frank discussion of challenges, issues, successes, failures, and what we have learned about implementing and maintaining a portal. Though goals and environmental factors vary across institutions, our experiences can provide valuable lessons for those who are now evaluating vendors’ offerings and trying to develop a portal strategy.

Background

When the idea for WIN, the Wake Information Network, was first conceived in the fall of 1996, there were no definitions to either guide us or limit our vision. Wake Forest was in the first year of its ubiquitous computing plan, having distributed IBM ThinkPads to every entering freshman, more than half of the faculty, and many staff members. The plan called for continuing this distribution to each entering class, so that every student, every faculty member, and all staff members who used a computer would have a ThinkPad with a full-featured standard software load within three years. The plan included replacing student and faculty computers every two years, so the ongoing commitment to enabling the use of technology on campus was clear. Though the plan was focused on the use of technology in academic areas, this was a fertile environment for bold ideas that capitalized on these abundant resources.

The idea for the portal was triggered by our university president's mandate to eliminate the long lines at our arena-style class registration. Students were already using their ThinkPads for class work and communications with their instructors and each other. Extending computer use to other facets of student life was a natural next step, though a challenging one. As manager of administrative computing services, I was pondering the complexity of this task when our student records software vendor, Software Research Northwest, Inc. (now part of Sungard Bi-Tech, Inc.), announced a product that provides web-based class registration. The product, IRISLink, included other web services such as class rosters, class schedules, grade reports, and demographic information with the personalization and filtering capabilities that are now characteristic of portal products. I

proposed to implement these services and expand the concept by building additional web services and infrastructure around IRISLink to improve communication and convenience for the entire university family.

Implementation Issues

Getting Started

Continuing discussions on listservs and the popularity of portal development as a topic at higher education conferences seem to indicate that one of the biggest hurdles in building a campus information portal is defining the project and getting it off the ground.

The following factors helped us overcome this problem:

1. I submitted a formal proposal for project funding to the Vice President for Finance and Planning. The proposal included a timeline and numerous examples of services the portal might include. The proposal's acceptance represented a major commitment at a high administrative level. Letting the project flounder in endless rounds of discussion simply was not an option.
2. The project was given high priority and was funded and staffed for success. Developing the concept and managing the project became my only job. I hired a software engineer and a part-time graduate student whose only responsibilities were directly related to developing the portal.
3. Our 3-person team had the authority to make the decisions and purchases necessary to deliver the promised services. Though I deliberately chose a collaborative approach to developing the portal's services, I was never hindered or delayed by a requirement to have decisions approved by a committee.

4. Early in the project's organizational phase, I chose and announced a launch date for the portal. We made adjustments as needed to the list of services that would be included in that initial launch, but we never changed the target date. This strategy strengthened the commitment and created the sense of urgency needed to keep the project moving.

Balancing tradition with progress

Another challenge in building a campus information portal is managing change by choosing a portal strategy that moves the campus toward its goals while preserving enough tradition to ensure acceptance. An environmental scan to raise our awareness of Wake Forest's defining characteristics and competitive advantages provided the guideline for our strategy. Wake Forest is a relatively small private university, with an enrollment of fewer than 5500 students and a tradition of high interaction among faculty and students. The vast majority of our students live on campus; distance education is not part of our mission. Students expect and receive personal attention both in class and in their dealings with staff members who provide administrative services. Wake Forest is a place where strong relationships are forged and the phrase "university family" has meaning. It is also a place where change is often viewed with skepticism, decision-making is usually collaborative, and exceptions to rules are not uncommon. A one-size-fits-all portal that masked our strong identity and respect for individuality would not have been successful for us even if it had been available for purchase at that time. While IRISLink jump-started our progress by delivering functionality we needed, its architecture allowed us to seamlessly integrate the non-IRISLink services we developed. In addition, it gave us the

flexibility to expand in directions of our choosing, to add new services when the timing was right for us, and to define the scope, appearance, and navigation methods for a custom fit to our campus. Choosing a build-*and*-buy model allowed us to create our own balance between tradition and progress.

Involving the right people

It was neither possible nor desirable for my small project team to build a full-featured intranet in a vacuum. We needed assistance, buy-in, and decisions from administrators in areas where the institutional data were maintained and business processes were likely to change when the portal became operational. We also needed help in gathering input from the campus community regarding information and services that we should include. Therefore, a critical early step was to share the vision with these administrators and create a coordinating group who could help drive the project to completion.

The project team had spent its first few weeks creating a test environment using copies of our institutional databases to populate the IRISLink services. This gave us a core set of operational web functions to spur our imaginations and help us determine what was technically possible. We invited administrators from areas that controlled most of our institutional data to a demonstration of these core services. This visual presentation was instrumental in clarifying for this audience the somewhat nebulous concept of an intranet. Seeing familiar information in a secure web environment created a lot of excitement among those present, and quickly resulted in a list of volunteers to serve on the coordinating committee. The group chose and began using WIN as the name

of the portal in conversations, communications, and meetings. This became increasingly important as the circle of those involved widened and name recognition for the project became an asset.

Exposing data issues

Populating the test environment with actual data served another valuable purpose by allowing us an early private view of how our institutional data looked in a web environment. This revealed some data issues immediately, including the following:

- Data entry practices that are appropriate for a paper-driven environment are often inappropriate for a real-time web environment. For example, recording selected data in all capital letters makes it more noticeable on printed reports but completely unacceptable for web publication through the portal. Similarly, abbreviations that were used routinely to save space on printed reports were unfamiliar to the broader audience seeing that data through the portal.
- A portal changes the data distribution model radically. Paper reports usually have limited distribution because of paper costs and storage space considerations. Publishing information through the portal makes it both economical and easy to distribute information to a wide audience. Policy must replace mere practicality in making data distribution decisions, and in many cases the policy has never been defined. For example, it was neither possible nor practical to distribute directories or reports containing student and staff photos. However, it was easy to include photos in the internal campus directory in the portal. No policy existed to address the privacy issue surrounding publishing these photos in a secured environment.

- Outdated information becomes glaringly obvious. A portal can necessitate changes in long-standing business procedures in offices where data entry is a major activity. Changes such as address updates can no longer wait in a stack on someone's desk until they are needed for a major mailing or a printed report. Campus constituents can view personal information around the clock through the portal, and they expect changes to be made in a timely manner. This forces the staff responsible for those changes to rearrange their workload to make these updates a daily task rather than an occasional one.

Having representation from many business units in the coordinating group was essential to identifying these problems. Each group noticed issues with the data under its control, issues that may have escaped the notice of the project team. The tasks of developing and enlisting support for new policies, procedures, and standards were a natural outgrowth of the coordinating group's examination of the data.

Gathering information from campus constituents

With a foundation of sample services in the test account and a vision clarified by many discussions within the coordinating group, we began a series of focus group meetings to gather input from the campus at large. We invited a cross-section of our campus to participate, creating nine groups of approximately a dozen students, faculty, or staff members. We conducted each focus group session in the same way:

1. Each meeting began with a demonstration of the sample services, as there was as yet no public concept of an intranet or a portal. The demonstration helped move

the groups from blank stares to a dawning understanding of what we were undertaking.

2. We asked each group the same question: What hassles that you routinely encounter as part of your campus life might be addressed through a similar online service?
3. We recorded and discussed all ideas and suggestions within the group in order to gain an understanding of the perceived benefits and problems associated with each.
4. Each group prioritized its item list through weighted voting, where each person could assign point values to five items in order of importance.

The coordinators used the prioritized requests to establish the master list of services for consideration by the project team. In some cases, we gathered additional information through personal interviews with deans, vice presidents, or other officials who were familiar with laws, policies, Board of Trustees' mandates, or traditions that we must not breach.

One common method of gathering information that we did not use was surveys. In 1997 and early 1998, there was still no concept of a portal or intranet in the minds of our campus constituents, so demonstrations and face-to-face exchanges were necessary in order for us to get meaningful feedback.

Selecting Services to Implement

As previously mentioned, the project team rather than a committee had the authority to make final decisions regarding the portal. The team looked at each request

on the focus groups' lists and evaluated its technical feasibility before making implementation decisions. Considerations other than popularity become important when requests are thoroughly analyzed, and these factors can determine the success or failure of a service. These considerations and examples are worth examining for anyone who is considering implementing a portal.

The first consideration is whether the data required for the service is available and is already maintained as part of someone's routine. If not, the service is a questionable candidate for successful implementation. For example, one feature that students suggested was a listing or calendar of entertainment and social events in the local area. In order to provide this service, someone would have to gather and update this information on a regular basis. There was no one to assume this responsibility, so we did not consider this service for implementation. As the popularity of the Internet has grown in the years since 1997, someone in our city has developed just such a site, and we now provide a link to it from WIN.

We bent this data-availability rule in order to develop one of the most requested services among faculty and staff, and as a result we learned a valuable lesson. The request was for a meeting-room finder, through which individuals could search for meeting space on campus with specified characteristics and make a request to reserve the room. The immediate challenge was the lack of central control over meeting spaces on our campus. Responsibility for various rooms is widely distributed and there is no inventory of available meeting spaces. Due to the overwhelming popularity of the request, the coordinating group gathered information on all these spaces and who controlled them, then convened a meeting of these people to discuss the idea of

collectively managing the information through WIN. No one was willing to relinquish control of meeting space to someone else, but all were willing to participate in maintaining their own information in a common database. The project team developed a service that allowed each person who had space management responsibilities to enter and update information on his or her designated spaces and to remove rooms from the inventory. This worked well during the first year after WIN's implementation, but people soon forgot about maintaining this information because it had never been part of their daily routine. Staff responsibilities for various spaces changed, the inventory itself changed as existing buildings were remodeled and new buildings were built, and the database gradually became more out of date and less useful. The service was finally dropped from WIN after three years.

Two similar services that were successful illustrate the subtle difference between what works and what does not. These examples are the WIN Announcements, allowing selected administrative offices to post announcements for entire constituent groups (faculty, students, alumni, staff, or any combination of these), and the Forms and Documents Library, allowing departments to post downloadable forms for use by members of the campus community. Both services involve new data management tasks by a widely diverse group across many departments. WIN Announcements are sometimes a supplement to existing communication methods such as sending memos, but are more often a replacement for ineffective methods such as posting signs around campus and word-of-mouth. The Forms and Documents Library allows a department to ensure that its most recent version of a required form, such as a travel reimbursements form, is always available for campus constituents. Unlike paper forms, the electronic

forms can contain error-reducing features such as totaling or calculating travel allowances based on mileage. Both WIN Announcements and the Forms and Documents Library require new tasks for those staff members in each department who manage posting the announcements or forms, but the departments reap benefits in terms of enhanced communication and greater accuracy. These benefits make them willing to take on the new tasks and make them part of their routine, whereas there had been little or no payback for the meeting space managers to take on new data entry tasks.

A customer service orientation is a second consideration in deciding which services to implement. In order to be considered, a service must provide a visible direct benefit to large numbers of the university family. Cost savings and efficiency gains in business offices might be a result of some services, but are not the reason for their development. Some services result in marginal efficiency gains at best for the business staff, but huge benefits for its campus customers. For example, getting a permit for parking on campus had always required that faculty and staff members fill out a multi-page bubble sheet that was available only in the Parking Office, located in an out-of-the-way building on the edge of campus. Though the staff members in that office were perfectly satisfied with their scanning equipment and their process worked well for them, it was a time-consuming inconvenience for faculty and staff members who had to go there to register a vehicle or make any change in their registration. Handling this process online was high on the list of requests from focus groups. We implemented the WIN Vehicle Registration service, enabling faculty and staff members to submit these applications as web forms and receive their parking stickers in campus mail a few days later. The cost savings are minimal for the Parking Office staff because they already had

an automated process, but the benefits for the campus community in time and convenience are great. This customer service orientation helps ensure that WIN provides value for the majority of our campus family members, and guides us in setting priorities for the development team.

A third and very important consideration in deciding which services to implement is whether or not the business offices whose processes are affected by the service are willing to participate and able to reengineer their procedures as needed. The parking permit again serves as an example. Permits for faculty and staff are free, so the process change for implementing the permit application as a web service was confined to the Parking Office. However, permits for students involve a complex payment scheme and thus also involve the Financial and Accounting Services (FAS) Office. Changes were underway in the FAS office during WIN's initial development period, both in their finance software and their methods and procedures involved in accepting credit card payments. It simply was not a good time for them to work with us on such a service. Thus, the capability for students to get parking permits through WIN was not part of the initial implementation.

A final consideration in choosing services is the level of effort required to implement the service. This is a classic case of "picking the low-hanging fruit". We delivered many IRISLink services regardless of their priority because there was minimal time and effort involved in doing so. We also delivered some lower-priority services such as a birthday calendar whose development we could assign to a work-study student with minimal programming skills. We were later surprised by the success and popularity of some of these services. We kept the number of complex, time-consuming services to a

minimum because of our timeline for the initial launch of the portal. The end result was that we delivered a well-rounded, full-featured portal with something of interest to almost everyone.

Technical Design Issues

Technical design issues fall into two categories: design of individual services and overall technical design principles. To manage the design of individual services, we invited focus group members and their colleagues to meet with the project team to provide more detailed requirements and critique the results. This approach was particularly successful with faculty and academic advisers, who met with the project team weekly during the development of instructor and adviser services. Their direct input resulted in services with exactly the information faculty and advisers need arranged in the ways they want it, ways the project team would not have anticipated.

The second category of technical design issues encompasses several principles that contribute to making the portal self-sustaining and reducing maintenance for the technical team. These principles include minimizing access control tasks, building tools to put management tasks into the hands of others, making the portal self-cleansing, minimizing the effort involved in changing a service's presentation, and facilitating the addition of new services. Because these issues are so fundamental to the success of maintaining the portal as a viable, long-term tool, examples are given below to clarify each concept.

Managing access control for various services can become a full-time job without planning and design. One strategy we used for minimizing access control tasks for the

technical team was to successfully incorporate the task into someone else's routine. As an example, there were a number of WIN services for which we needed to grant access to either the chair or the administrative assistant in each academic department, and no one maintained database markers to indicate the identity of members of either group. Thus there was no information available to WIN for access-control decisions. However, the registrar's staff kept such information on lists that they used frequently. The WIN team developed a method by which the registrar's staff can keep this information in database markers instead of lists, and many WIN capabilities are now granted automatically from those markers. The benefit for the registrar's staff is two-fold: they can communicate electronically with these groups through both WIN and their student information system, and the department chairs and their assistants can use WIN to get information for themselves that they formerly would have requested from the registrar's staff. Thus the key to success in getting people to take on new access management tasks for the portal is to make sure that the portal provides rewards in return.

Some services, particularly data-management tasks such as processing address changes, must be granted to one or more people across several departments. In such cases, there must be an access control list to determine who in each department has those specialized WIN privileges. We sought a strategy that would minimize the task of maintaining access control lists for the Information Systems staff. To accomplish this, we developed a Group Permissions WIN service for managing access rights to other services. It allows the Information Systems staff to quickly grant control of a specified service to a key contact in a department; that contact then gains the capability to grant access rights to others within his or her department to the specified service. This reduces

the maintenance burden for Information Systems to one departmental contact, and puts further control into the hands of trusted contacts who know which of their colleagues should have the WIN capabilities in question. The lesson in this example is to develop a tool for making tasks easy to distribute to others when the tasks cannot be avoided entirely.

Another essential factor in making a portal self-sustaining is to make it self-cleansing by ensuring that old information is deleted on a regular basis. WIN has a number of features that allow an individual to post information, such as a Ride Board for students, Classified Ads for everyone, and a Used Textbook Exchange for students. A critical design feature of each of these services, as well as the WIN Announcements service, is that entries expire and are automatically deleted from the system by a WIN process after a specified period of time. This relieves both the technical staff and the individual posting the information from the task of remembering to delete postings, and keeps WIN's information fresh.

Minimizing the work required to change a screen's text or appearance is also a key factor in reducing maintenance for the technical staff. To facilitate such changes, the project team separates the business logic from the scripts that control web presentation. Developers can make changes to a screen's text or appearance quickly without modifying program code, and can grant designated staff members in some departmental offices the capability to manage the appearance of their own services. For example, one service allows alumni to apply for a free WIN account and a Wake Forest e-mail forwarding address for life. Certain staff members in the Alumni Office can manage the wording and content of the application page using these WIN tools. Designing services and

developing tools to put control in the hands of those who have the information readily at hand minimizes ongoing maintenance for the portal developers.

The method for adding new services to the portal is another design consideration in developing a low-maintenance portal. WIN's dynamic menu generation feature allows the project team to add new services with minimal effort, making the portal highly extensible. Any part of the WIN menu can automatically expand to many items or disappear entirely depending on what the user is entitled to see. However, no one has the labor-intensive task of maintaining HTML links as we add and remove WIN services for various groups. We can plug in a newly developed service within minutes by simply adding entries to tables containing names of services and groups entitled to receive those services. This was a design feature of IRISLink that we adapted and extended to our own development.

Tools and Technology Decisions

The pace of technological innovation coupled with the many options available when choosing a server platform, languages, web server software, and security tools can easily freeze a project team into inaction. Our development team simply made initial choices based on their skill sets and their research into security, scalability, and extensibility. However, no choice was viewed as permanent. The team continued to monitor the latest developments during the initial implementation period and made adjustments to those initial choices when needed. Over time we have successfully moved parts of WIN from NT servers to Unix servers based on the skills and expertise of the project team members. We have adopted new technologies such as XML as they have

emerged. We have successfully migrated some early services to a new database engine in keeping with a change in other campus systems. The strategy for anyone who is considering developing a portal or purchasing a portal product should be to choose tools, hardware, software, and products that your staff can support, then remain open to change as circumstances dictate.

Managing Risk

The risk factors for a portal service are similar to risk factors for traditional business applications. Risk increases with the complexity of the service, the number of departmental boundaries crossed, the number of interrelated processes involved, the level of opposition to change among those who are directly involved, and lack of high-level support for the change. These factors can be dealt with in traditional ways. An important difference, however, is the high visibility of web services, which adds an even higher risk factor to portal development. Unlike the situation with traditional business services that are typically viewed or used by a few people, the audience for web services can be hundreds or thousands of people. We took several steps to manage this high-visibility risk. First, we counterbalanced the risk inherent in the data itself with the complexity of the service. For high-risk data such as students' grades, we implemented simple view-only services for the initial launch of WIN. More complex interactive services that involved submitting new data or changing existing data were reserved for lower-risk information, where a malfunction would be of much less consequence.

Our second strategy for managing risk was to take advantage of our vendor's expertise and resources for high-visibility, complex applications such as class registration.

Through detailed planning with the registrar's office and others directly affected by web-enabling class registration, we were able to adapt the software and our procedures in such a way that essential functionality of the vendor's product was unchanged. After thorough testing on our own, we conducted our first registration as a pilot with 100 students rather than the entire student body. The pilot uncovered some unanticipated data problems, but recovery was not difficult because of the small number of students involved. By the time of the first full registration for all students, we had solved those problems and gained several more months of experience in monitoring and fine-tuning complex applications. Since the initial launch of WIN, we have developed additional high-risk services such as student payroll timecard submission and approval. As our experience increases, the risk involved in deploying such services decreases.

Protecting an individual's privacy while granting access to information is of utmost importance on a college campus. The risk associated with violations of the Family Educational Rights and Privacy Act (FERPA) is very high. To address this risk, the team designed WIN's directory services to follow existing privacy settings managed by the various university records offices. For information not already covered by those privacy settings, the team developed a WIN Preferences service that enables each individual to manage his or her WIN password and to specify whether or not to display certain information in WIN services.

Another risk-management strategy that we employed addresses the well-known risk associated with unpredictable usage levels for web services. Nothing generates unfavorable publicity as quickly as a web server that cannot respond to demand. We had no history on which to base predictions for usage, so we deliberately launched WIN with

little fanfare during the summer when the majority of our students were gone. This gave us time to monitor performance and usage patterns and learn to manage them while our population was low and unanticipated downtime could be tolerated.

The final risk-management strategy was ensuring that there were alternatives to WIN services for some period of time after its initial implementation. For example, faculty members could still request and receive paper copies of their class rosters; they could submit their grades on scan sheets until they became comfortable with submitting them through WIN; academic advisers could still get paper copies of students' degree audit reports. In addition to relieving pressure on the technical staff, this approach allowed acceptance of WIN by the campus community and confidence in its capabilities to grow before it became the *only* method for accomplishing any task.

The Ongoing Challenge—Growing Demand

With success comes increasing demand. We launched WIN on a largely unsuspecting campus that had never envisioned such a thing and had not requested it. However, students enthusiastically embraced the internal campus directory, with photos included, and discovered that they could find their grades on WIN well before the grade report arrived in the mail. Faculty members found that trips to the registrar's office to get information were far less frequent. Students and faculty members studying and working abroad found it easy to register for the next semester's classes or to submit grades through WIN from anywhere in the world that Internet connectivity was available. Ideas and requests for more WIN services began to stream in soon after its initial implementation. A significant milestone occurred when the university's controller

required that department heads submit budget requests through WIN rather than on paper. Subsequently, the Romance and Classical Languages faculties requested and collaborated with the WIN team in developing language placement test services for incoming students. True to our design philosophy of making WIN self-sustaining, the team developed a test wizard rather than a test requiring continuing maintenance by technical staff. Faculty members in each language area use the wizard to manage the test's content and scoring rubrics. Faculty, advisers, and students now benefit from immediate test results, which are fed into the class registration system. Tests for these languages are no longer given on paper, and analysis is underway for incorporating placement tests for other academic disciplines into WIN. All of these factors are indications of WIN's acceptance as a vital method of conducting business on our campus.

The growing demand has contributed to changes in the organization and allocation of resources in the Information Systems department as the university has changed the way it does business. In late 2001, the WIN team has grown to include several developers plus server and database management specialists that were formerly part of other teams. Server scripts automatically notify staff members when any WIN overnight process fails or when other problems occur that affect its availability. In addition to these operational changes, the department has changed how it manages requests for new WIN services. Rather than the informal approach necessary to get the project off the ground initially, a more formal request and approval process is now used due to competing demands for resources, though the original criteria for choosing services to implement continue to apply.

Solutions and recommendations

The value of a portal is greatest when the institution determines its own strategy rather than adopting someone else's vision and definition. Though there are many examples of what has worked for us in previous sections of this paper, the ultimate strategy for your campus must be your own. Based on our experience, I have some general recommendations for developing a strategy.

First, assess your technical environment. Align your strategy with the existing environment and the institution's strategic plan for computing resources. Just as many of our decisions are driven by the fact that every student and faculty member has a computer with a standard software load readily at hand, your portal strategy must reflect the resources available to your campus constituents. Evaluate vendors' products for fit with your technical environment to be sure you are purchasing services that you can reasonably implement and make available to your campus constituents.

Second, strike the appropriate balance between tradition and change at your institution. Involve people in the project who know and respect the institution's history but are not afraid of change. Though WIN's acceptance is no longer in question, we remain very much aware of our campus culture of collaboration and the need to respect our traditions while quietly enabling change. Evolution rather than revolution is a good strategy for our campus, but may not be right for everyone.

Third, base decisions on what your campus wants and needs rather on someone else's definition of what a portal should be. The needs of a small residential campus such as ours differ greatly from those of a university with a large percentage of non-resident or

adult students. For example, distance education is not a part of our mission; it may be vital to yours. This may dictate the need for a strategy that is quite different from ours. That decision must be the result of a careful needs analysis.

Base decisions on needs, but also on what your campus can support. Use tools that your technical staff can manage successfully. Take advantage of products and services from vendors with whom you already have relationships and technical compatibility. Implement self-sustaining services based on your campus data stores, using data that someone already maintains routinely. Design services to put control of content into the hands of those who have the knowledge and the motivation to keep it up to date.

Finally, keep two words foremost in your decision-making process: add value. Use your resources to implement services that will add the most value for large numbers of users, services that they cannot get elsewhere.

The Future

In the fall of 2001, WIN has become such an integral part of the campus fabric that it is now considered to be an essential service rather than a convenience. Automated processes create accounts as needed daily for any newly admitted student or newly hired employee. More than 10,000 alumni in several countries have WIN accounts, and the number continues to grow. Strategies for making WIN services more easily accessible on hand-held computing devices are under consideration. The long list of requests for new services ensures that WIN's role will expand in the future.

Beyond our own institution, the trend toward portal implementations appears to be strong. The strategy of community building has been widely adopted by commercial enterprises as well as educational institutions. Commercial enterprises build portals to gain customer loyalty and thus repeat business; the portal enables them to do targeted marketing as well as to retain some personalization in the absence of face-to-face contact. Universities lack the direct profit motive for building a portal, but targeted communication, community building, and retaining personalization are important for educational institutions as well as businesses. Technology can easily drive an organization from low-tech, high-touch interactions to high-tech, low-touch interactions with its constituents. A portal's value is in allowing the university to maintain both high-tech and high-touch interactions with its family, who are always just a mouse-click away.

Conclusion

A portal is an important asset in an institution's ability to provide services and to meet the growing expectations of students, faculty, staff, and alumni. Web-based services are becoming the norm rather than the exception. An institution's ability to compete for the best students and the best faculty is based not only on its academic reputation, but also on its ability to provide a good environment in which to teach, learn, and work. Former generations of students and faculty were most comfortable using a pen and paper; future generations will be most comfortable using electronic communications and services. A portal's value as a tool for communication and for conducting the

business of the college or university will grow as our society becomes increasingly empowered by technology.