If You Build It, They Will Come

Content management expands collaborative learning at the University of Wisconsin

By **Cathy Riley**

When Annie Stunden came to the University of Wisconsin–Madison in 1999 as CIO, she had a vision of providing all students, faculty, and staff their own Web sites where they could store and share documents and files, a place where they could easily and intuitively collaborate with each other. Before joining UW–Madison, Stunden had been CIO at Cornell University, where her team implemented a system for faculty and staff to publish Web sites for posting research and résumés. However, the size of the campus community at UW–Madison (more than 40,000 students and 13,000 faculty and staff) made the prospect of implementing a campus-wide, secure content-management and file-sharing system seem daunting.

The Changing Landscape of Learning

Collaboration technologies are changing the way groups meet and work, both in the classroom and outside of it. Whether advances in technology fuel collaborative learning, or the need for more project-oriented, team-based learning drives the technology, one thing is certain: collaborative learning technology is now embedded in the learning process and will become an increasingly critical part of the higher education learning experience.

At UW–Madison, we had seen a growing need to provide technical support for this collaboration—a need fueled primarily by the growth in mobile computing and a decentralized LAN environment. Steadily increasing numbers of students, faculty, and staff are purchasing laptops and taking advantage of the wireless access points on campus. Currently, more than 12,000 students and almost 6,000 faculty and staff use laptop computers at UW–Madison. The growth in wireless computing has encouraged faculty to post course materials on the Web, enabling an "any time, anywhere" collaborative learning environment. Students can review study materials posted online, conduct research, and prepare assignments from dorm rooms, the library, and the student union. They also have full access to the resources of My UW–Madison, our secure campus portal, where they can access student records, calendar functions, and Learn@UW, the course management system.

As we looked across our campus, the common thread between faculty and students was the need to exchange documents and information within restricted groups. Information was shared in a variety of ways, primarily through physical media (floppy, zip, USB drives) and e-mail. Such methods of sharing information run into a number of problems, most notably a lack of security, backup, and content control.

Where We Had Been

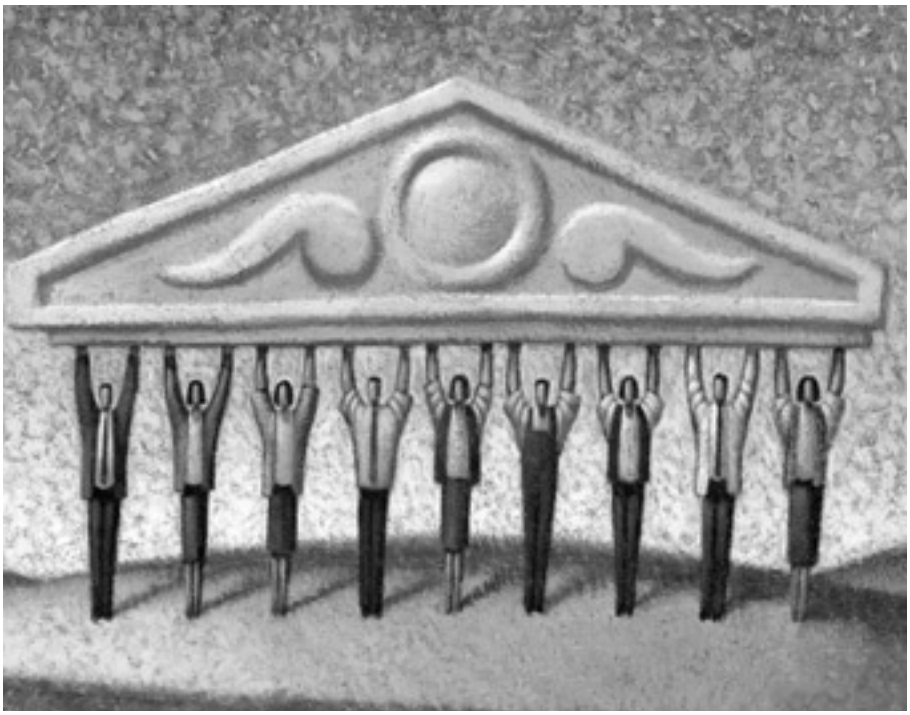
At the time Stunden joined UW–Madison, the Student Information Technology (SIT) system provided student Web hosting. SIT, which was run by a group of students with some assistance from other campus entities, provided students the ability to publish a personal Web site. This service was not widely known among students across campus, however, though some teaching assistants (TAs) used it to create personal Web sites to post course information, homework assignments, résumés, and other research materials. Although faculty and staff had access to department-sponsored Web sites, they had no central location for personal Web sites or for document sharing and storage, making interdepartmental collaboration difficult at best.

Our student-run Web hosting system fell short in a number of other key areas. It did not provide the ability to assign permissions and share files and directories without making them completely public. The service had no backup strategy and no guarantee of service. If a user encountered a simple problem such as forgetting a password, the students supporting the service would respond when they had time, which could be weeks or even months later. Another problem was the proliferation of obsolete Web sites: of about 5,000 accounts on the system, fewer than 1,000 were still valid.

Security was another major drawback with the SIT system. In the university environment, security and confidentiality are crucial, and the institution must ensure that all systems comply with the Family Educational Rights and Privacy Act (FERPA) and with university and state policies regarding personal information. Because the SIT system was designed simply to provide a space for students to experiment with developing their own Web sites, security was only minimally addressed. The servers allowed non-secure access, and there was no policy in place to address any of the university and state policies regarding personal information.

Choosing a System

One of the biggest challenges to supporting collaborative technology is the



distributed environment at most universities, and UW–Madison is no exception. Through the Division of Information Technology (DoIT), UW–Madison maintains an environment of information technologies that support the academic and administrative activities on campus. DoIT provides a broad variety of technology services to faculty, staff, and students across a highly diverse desktop and server environment that includes PCs, Macs, Linux-based machines, and computers with many other operating systems. Finding a system that would facilitate communication and collaboration across the university's departments and colleges was a factor we had to address if we were going to make Annie Stunden's vision a reality.

A task force was assembled to evaluate various options, both for hardware and software. The task force included DoIT staff, and technical staff from other campus agencies were consulted in identifying desired features of a new system. The task force considered a number of selection criteria, among them, compliance with prevailing and emerging standards; the "fit" of the software with respect to present, planned, and possible future uses; and scalability.

We envisioned a system that would provide the ability to drag and drop information from a PC, Mac, or Linux desktop to secure servers, with a Web interface that would allow users to continue working with their files even when they didn't have their own computers with them. We needed a way for members of the campus community to share data securely within restricted groups that included individuals with widely varying levels of technical skill.

Because campus users work at different times from campus, from their homes, or while traveling, we needed a way for them to store everything from classroom assignments and portfolios to résumés and research projects, all in a central location where they could be accessed and shared with other students and teachers. As we looked at criteria for a new document-sharing system, we identified compliance with LDAP, the lightweight directory access protocol, as another important factor. In our planning, we looked at a three-year period and anticipated 20,000 users, but we wanted to ensure that if we exceeded that number we could easily add hardware and software licenses without having to rebuild the entire system.

The task force considered options from vendors including Microsoft, Intel, Apple, and Sun, as well as the possibility of a homegrown Linux-based system. Open source solutions were also researched. Ultimately, the task force recommended a system combining hardware and StorEdge QFS software from Sun Microsystems with an application called Digital Locker, developed by Xythos Software.

Several key factors were the basis for the recommendation. The system worked well with the campus LDAP; several of the alternatives did not. In addition, it offered the bandwidth and storage management we needed, as well as the browser interface Stunden requested. It also provided a measure a scalability that the other solutions did not.

The solution we chose frees us from having to attach user accounts to a particular server. With the new system, we have five application servers, all of which can read/write to the same file space. When we need to add capacity, we simply add another application server or increase the file space on our storage area network. This arrangement requires few or no service outages or reconfiguration for increases in capacity, keeping ongoing costs for the system relatively low.

Several other institutions—primarily for us, the University of Illinois, Urbana–Champagne—had successfully implemented similar solutions. Their success was another contributing factor in our decision.

The Digital Locker software required little customization to meet our needs, keeping development and support costs low. Compared to the alternatives we considered, Digital Locker came with most of the desired features and functionality, so we did not have to spend resources to make it work with the existing campus infrastructure.

The solution we chose is cost-effective, both in terms of acquisition and for maintenance and upgrades. The university already owned Solaris OS licenses, and Sun's hardware was not significantly more expensive than other options. With educational discounts on software licenses, both for QFS and for Digital Locker, the actual costs including support are approximately $14 per year per user for 20,000 users, or about $10 per user for 30,000 users.

Prior to implementing a production

service, we conducted an extensive pilot. For six months, 400 people with varying degrees of technical aptitude piloted the solution. On a weekly basis, we e-mailed these users and asked them to try specific features. We asked them to tell us whether they liked the features, whether they worked in ways the users expected them to, and whether the documentation was adequate. We incorporated this feedback into the documentation and focused on confusing areas in training sessions and in the FAQ section of our service Web site.

We also load tested the application during this test period. Because students, faculty, and staff all use the system for critical projects, we needed to be sure that the entire system wouldn't grind to a halt if everyone on campus tried to access a hot new Web site. The university did not own load-testing software that would have worked adequately with the system, however, so we decided to use the pilot users, who, it turned out, were excited to participate in the load test and found it to be great fun. On a single day, during two 15-minute time slots, we asked them to go online simultaneously, uploading as many files as they could, renaming them, copying them, and so forth. The test showed that the system could handle periods of significant usage without a decrease in performance, providing us with confidence that it could handle the potential load of 20,000 users. The pilot program also led to the name "My WebSpace," by which the system became known.

Results and Reactions, Expected and Not

My WebSpace was announced to incoming freshman during summer orientation sessions in 2004. DoIT held several brown-bag "how to" sessions, and usage of My WebSpace grew quickly. Users from departments and colleges across campus signed up, and My WebSpace saw an initial average growth rate of 580 new users each week.

With 20,000 people on the system, each with a 100-megabyte storage quota, we could not afford to permit a single user to tie up all the network bandwidth, leaving others locked out of the system. Digital Locker gave us the ability to control usage by giving each user a bandwidth restriction of 200 megabytes per hour.

In the UW College of Letters and Science, faculty in the French and Italian departments require TAs to make coursework available to students on the Web. A professor of Japanese language and linguistics uses My WebSpace in her teaching methodology course because she believes it is increasingly important to incorporate information technology components into any teacher-education program. Her students use their e-portfolios to develop teaching philosophies and to post videotapes—which are later reviewed and critiqued by fellow TAs—of themselves teaching actual classes.

The UW Arts Institute found My WebSpace to be an ideal solution for tracking and coordinating information on the 150 pieces of media shown during the four-day Wisconsin Film Festival. With LDAP for authentication, they were able to assign permissions based on NetID. Posting information on the site meant no longer overloading the e-mail server with large attachments.

When we need to provide distance learning students with access to the My WebSpace site, all an instructor has to do is issue a "ticket," which provides limited-time access to a directory or file. Tickets can give users read and write access to the classroom Web site. The ticket option also allows users to collaborate with colleagues at other educational institutions or with community members on projects. One teacher of distance-education technology uses tickets to let her students work collaboratively on a case study for three weeks, creating from one to five Web pages that they post for others in the class to view. Other students use My WebSpace to upload draft presentations so that classmates can critique and correct them. The final results of a project are posted on the site and presented to the entire class. The collaboration that this instructor experienced would not be possible without the My WebSpace ticket option.

We were also surprised by users' novel and inventive applications of My WebSpace. The Office of Human Resources has adopted My WebSpace to facilitate easy collaboration and document sharing across the campus's diverse computing networks and platforms. The Campus Library disseminates online journals to students through My WebSpace. Students can upload the journals stored on the library's site into their My WebSpace account and print them wherever they want.

Conclusion

What started as Annie Stunden's vision has turned into reality. Every day we hear about faculty, staff, and students using My WebSpace in ways we never imagined. We currently have more than 19,000 users and more than 1,000,000 files and folders on My WebSpace. We are fortunate to have implemented a scalable solution with an open, flexible architecture. It not only adapts easily to our current infrastructure but also gives us the ability to grow and change our infrastructure as the university's requirements evolve.

During the 2005 academic year, we announced a new Group Directories offering for departments and have found that professors are also using the feature for their classes. We promoted My WebSpace to a new class of freshmen and purchased an additional 10,000 user licenses. Even with the level of growth we have seen, DoIT has been able to implement, manage, and support the solution without additional staff. Throughout the implementation and ongoing support of the system, we have been fortunate not to have any significant problems to address. My WebSpace functions well and is much appreciated by users across campus, who we believe have seen real benefits from the system. We believe we've given our staff, students, and faculty a great tool for collaborative learning, research, and content management, and they agree. Our students in particular have been telling us that they think My Webspace has opened a window to new ways of learning and new possibilities. Those possibilities will keep us at the top of our game as a leading research institution. *e*

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