

Web Content Management Systems in Higher Education

You can control a Web site's look and feel while letting the owners of information control content

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As the World Wide Web has matured, so have people's expectations of their Web experiences. After becoming familiar with what they can find and how to find it, Web visitors have begun to expect more and timelier information from the Web sites they visit. Web managers, in turn, have had to find new ways of meeting these expectations. For campus Web managers, the challenge is to meet these expectations in a largely decentralized environment and with a limited budget.

Nearly a decade ago, Gonzaga University realized it needed to establish a Web presence. Although Gonzaga still viewed print as its primary means of communicating with students, parents, and alumni, the expectation had arisen that anyone with an interest should be able to type an institution's name and ".edu" into a Web browser and instantly learn more about that institution. Our Web manager had the responsibility to ensure that information on the site was accurate, but no great emphasis was placed on the information being timely. Most print publications about the university were assumed to have a lifespan of a year or more, and information on our Web site was assumed to age in the same way.

Those expectations changed quickly, however. As our Web presence became less of a novelty and as traffic to the site increased, we realized the depth and breadth of information we had available to offer. The information was of value to our visitors, and our Web site was clearly a more efficient means of delivering it than more traditional methods. Moreover, people began to expect that information on our Web site would be the most current available.

As we continued to improve our site, visitors' expectations grew accordingly. The time it took for information to be considered stale decreased. Instead of accepting the year horizon of print material, our Web site visitors expected the site to be current as of the semester or even by the day. Instead of reading about a commencement speech from last week, people wanted to watch it live on the Web. As potential students updated their applications for admission on the Web, they expected the application status to be updated in real time.

Expectations about the breadth and the timeliness of Web site information change over time. Further, the Web site development environment at Gonzaga and in higher education in general is somewhat unique. Information that should be on a university's Web site is scattered about the institution and often closely guarded by its owners. In addition, most higher education institutions operate their Web sites on a small budget. Funding for Gonzaga's Web site competes with a variety of other projects, many of which claim a closer relation to the institution's mission.

Gonzaga's Web site is asked to convey information about the institution and to serve as a marketing tool. Although these dual purposes need not compete with one another, they often do. The academic tradition is one of free and open discourse, which means presenting both the good and the bad. Those outside of higher education tend to mistake vigorous debate for rancor and discontent. Marketing does not necessitate being untruthful about what you present, but it often requires being selective about what and how you present information. Bad news must be presented carefully

and in the right context. For the Web manager, this tension is unavoidable—the two positions must be balanced and criticism muted.

Challenges to Developing and Managing Web Sites

Gonzaga initially tried to develop and manage its Web site through a central office, an approach typical of most institutions at that time. This office was responsible for both the creation of the site and its content, and for keeping the site content current. This approach created a site that was consistent in look and feel, but one that grew slowly and was limited in the amount of information it made available. Various campus departments clamored for attention, and our Web manager was forced to choose: concentrate on site development to meet these demands and tolerate some out-of-date content, or build the site more slowly and try to ensure that content was always up-to-date. As a result, the Web manager became a bottleneck in the site's development and was criticized not only for being slow to meet the needs of offices demanding a Web presence but also for not keeping the site current. The university quickly learned that it could not afford a central office of the size needed both to develop the site and to keep it current.

Consequently, Web development began to decentralize. Individual offices began to hire their own Web developers, often students majoring in computer science or who had acquired Web-development skills elsewhere. At first the Web manager resisted this trend, as it greatly reduced his ability to manage the growth of the site and to maintain a consistent form and function. The university embraced this change, however, as it met the institutional desire for a Web presence.

This decentralized solution produced its own problems. Offices usually could afford the help of a Web developer for short periods of time, but not permanently. Office clerks and others soon found themselves pressed into service to maintain department areas of the Web site, a task for which they were often ill

suited. Additionally, each department had unique ideas about design, which resulted in the site's loss of visual cohesion. Each area of the Web site became as distinct as the office culture from which it emerged, and visitors were often unclear if they were still on the university's site. Site navigation became nearly impossible, as there were no rules enforcing a common navigation scheme. Moving from one area of the site to another disoriented visitors and often stranded them with no way of navigating back. The pieces of the puzzle—and that they were—followed no clear structure, which left visitors confused about the Web site and about the institution itself. This decentralized approach, while economical and effective from individual offices' perspectives, was clearly ineffective and a waste of resources at the institutional level.

Dissatisfaction with the Web site and its operation grew. Those departments with sufficient funds to hire their own developers wondered why they were responsible for Web development at all; those with insufficient funds were at the mercy of the Web manager's schedule. Nearly the entire university community had grown weary of the ever worsening, rag-tag appearance of the site. This mounting dissatisfaction proved valuable, in that it primed the community for the change about to come.

In the summer of 2001, the university president appointed a committee to research issues and to identify possible solutions. The committee was largely a volunteer group, composed of area directors from offices with a large stake in the university's Web site. In addition to the director of the area responsible for the Web site, committee members included the academic vice president, the vice president for university relations, the dean of admissions, the director of public relations, the university registrar, the dean of students, the dean of the library, and the dean of the school of professional studies. Most were also a part of the university's marketing committee and viewed the Web site as an integral part of the university's marketing efforts.

After some review and discussion, the

committee recommended that the university adopt a Web content management system (CMS). Such systems separate the construction and display of Web pages from their content. CMSs allow for controlling the look and feel of Web pages centrally while distributing responsibility for the content. They permit offices control of their area of the site, including the ability to create, delete, and reorganize pages. Most CMSs also separate the creation of content from the editorial control of that content and include some level of workflow control. Thus, an office clerk can create content and then have it reviewed by a supervisor before it is posted. The actual layout of the page and its overall look and feel are controlled centrally by the Web manager. The Web manager can also ensure a consistent system of navigation in all areas of the site.

Content Management Systems

Almost all Web CMSs help an organization achieve the following key goals:

- *Streamline and automate content administration.* Historically, Web content has consisted of static pages/files of HTML, requiring HTML programming experience and manual updating of content and design—clearly a time-consuming and labor-intensive process. In contrast, Web CMSs significantly reduce this overhead by hiding the complexities of HTML and automating the management of content.
- *Implement Web-forms-based content administration.* In an ideal Web CMS, all content administration is performed through Web forms using a Web browser. Proprietary software and specialized expertise (such as HTML) are not required of content managers. Users simply copy and paste existing content or fill in the blanks on a form.
- *Distribute content management and control.* The Web manager has often been a critical bottleneck in the timely publication and ongoing maintenance of Web content. At Gonzaga, our Web manager would have had to visit more than 50 Web pages each day just to review all content on our site over the course of a year. Web CMSs remove that bottleneck by distributing content management responsibilities to individuals throughout the organization. Those individuals who are responsible for content now have the authority and tools to maintain that content themselves—without any knowledge of HTML, graphic design, or Web publishing.
- *Separate content from layout and design.* In a Web CMS, content is stored separately from its publication format. For example, the university's mission statement could be stored in a raw, text format or XML, then formatted as needed to reflect separate graphic designs for both Internet and intranet sites, and formatted to display correctly on personal digital assistant (PDA) devices. Content managers enter the content only once, but it appears in three different places, formatted using three different layouts and graphic designs. All three pages immediately reflect approved content changes.
- *Create reusable content repositories.* Web CMSs allow for reuse of content. Objects such as templates, graphics, images, and content are created and entered once and then reused as needed throughout the Web site.
- *Implement central graphic design management.* Graphic design in a CMS becomes template-driven and centrally managed. Templates are the structures that format and display content following a request from a user for a particular Web page. Templates ensure a consistent, professional look and feel for all content on the site. They also allow for (relatively) easy and simultaneous modification of an entire site's graphic design.
- *Automate workflow management.* Good CMSs enable good workflow processes. In the most complex workflow system, three different individuals create, approve, and publish a piece of content, working separately and independently. (See Figure 1.) A good workflow system expedites the timely publication of content by alerting the next person in the chain when an action is required. It also ensures that content is adequately reviewed and approved before publication.
- *Build sophisticated content access and security.* Good CMSs allow for sophisticated control of content access, both for content managers who create and maintain content and for users who view and use it. Web managers should be able to define who has access to different types of information and what type of access each person has. (See Table 1.)

Figure 1

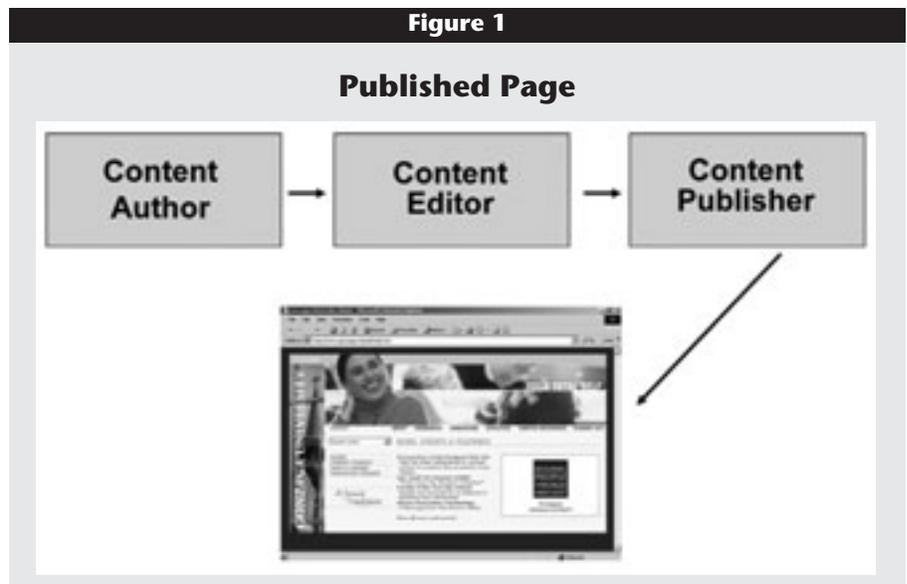


Table 1

Controlled Access to Information

Content	Individual	Title	Permission
Course Information	Dr. William Smith	Academic Vice President	Create, Edit, Publish
Course Information	Ms. Nancy Jones	Registrar	Create, Edit
Course Information	Dr. Sally Young	Department Chair	Create
Course Information	Mr. John Q. Public	Web User	Read

- *Make content administration database-driven.* The database is the key to CMSs. In a true CMS, static, flat HTML pages no longer exist. Instead, the system places most content in a relational database capable of storing a variety of binary and text materials. The database, then, becomes the central repository for content, templates, graphics, users, and metadata.
- *Include structures to collect and use metadata.* Because data is stored separately from layout and design, the database also stores metadata describing and defining the data, including author, creation date, publication and expiration dates, content descriptions and indexing information, categories information, revision history, security and access information, and a range of other content-related data.
- *Allow for customization and integration with legacy systems.* Enterprise CMSs allow for customization of the site functionality through advanced programming. They should expose the functionality of the system through an application programming interface (API). They also coexist and integrate with legacy systems.
- *Allow for archiving and version control.* Enterprise systems must provide mechanisms for storing and managing revisions to content. As changes are made, the system must store archives of the content and allow reversion of any page to earlier versions. The system must also provide the ability to prune archived content periodically, preferably based on a variety of criteria, including age, location, and number of newer versions.

In addition, quality CMSs must provide for scalability in terms of performance and data volume, flexibility in designing workflow processes based on the institution's needs, revision and history tracking, version control, and tools to manage content in multiple languages.

Choosing a CMS

Choosing a CMS can be a complex and difficult task. (See the sidebar "Choosing a Content Management System.") An almost frightening array of commercial vendors claims to offer content management tools for the Web. In fact, just narrowing the field to a core set of Web CMSs to evaluate can give Web site managers sleepless nights!

Institutions face four primary choices when considering CMSs. Schools with a large development staff may want to create a custom solution in house. Others might want to explore development frameworks such as Allaire Macromedia Spectra or NetObjects Fusion. Many will want to consider commercial, packaged solutions, and, finally, others will want to pursue open-source solutions like Zope. For any of these paths, a dizzying choice of suites exists with widely varying price ranges and features. (See the sidebar "Vendors, Vendors Everywhere.") Gonzaga's experience in selecting a Web CMS demonstrates the range available.

Approximately three years ago, Gonzaga's Web staff created a simplified Web CMS in house. It offered many but not all of the advantages of commercial CMSs, including simplified and distributed content administration, Web-forms-based content editing, centralized graphic design using

templates, and database-driven content storage.

Over time, the university recognized the value of the concept but realized that the custom solution had created two major problems. First, the system did not meet all the requirements, including automated workflow management, reusable content, revision and version control, metadata structures, sophisticated security and access control, legacy integration, and enterprise scalability. Second, the system required significant resources to maintain and even greater resources to improve and extend.

Gonzaga began to evaluate other options, including the development of a new custom application and analysis of commercial product suites. The first option was quickly rejected for failing to meet requirements. Several commercial packages appeared attractive, however. The university conducted a needs assessment to identify required features and components, which quickly narrowed down options. Many of the higher-end suites included functionality for e-commerce, mass personalization and customization, and document management as core components. None of these features represented significant initial requirements for Gonzaga, making it relatively easy to eliminate these packages and their high price tags.

Fortunately, as we defined our scope, we found a variety of moderately priced packages with the functionality we required. Several offered special academic pricing. A key consideration was our perception of the vendor's staying power. The committee viewed the selection as the beginning of a long-term relationship and wanted a reliable part-

ner. At least one competitor offering a custom-built solution went out of business during the committee's review. We chose a CMS from a mainstream vendor with whom we already had a strong relationship.

There is always a cost in moving to a CMS, whether the institution's choice of application is commercial, custom built, or open source. Each institution will need to weigh the pros and cons and choose accordingly. Due to staffing concerns, Gonzaga could neither build a CMS nor implement a less expensive and less mature application.

Site Design and CMS Implementation

The university identified three goals to be met by the redesign process:

- Distribute content management control to users throughout the university identified as responsible for content on the Web site.
- Restructure the navigation and architecture to enable our target audiences to more easily and completely find information of interest to them.
- Redesign the graphical appearance of the site to improve its appeal to our target audiences.

The university asked an educational marketing firm to assist with the development of a detailed structure, architecture, and graphic design for the site. The firm's team spent several months gathering information from campus stakeholders, prospective students, technical staff, and other interested groups and applied the results to develop a site structure that would best meet the needs of our intended audiences. The firm then designed a targeted look for the site.

The university also turned to a local implementation consulting

Choosing a Web Content Management System

Often the best lessons are those learned the hard way. While Gonzaga's experience implementing a CMS has been very positive, we certainly hit some bumps in the road. Our experiences lead us to these recommendations for avoiding potential problems.

- *Get buy-in from the top.* Make sure the president, provost, director of marketing, and director of public relations (or comparable decision makers) have participated in the decision and are visibly supporting your process.
- *Communicate, communicate, communicate.* Make sure that as many voices as possible engage in your deliberations. Faculty buy-in is essential, and don't forget about the people who will be doing the work—program assistants, departmental Web managers, students, and others.
- *Know where you're going.* Spend some time defining how your site will change under a CMS and how those changes will be implemented. Will a graphical redesign take place at the same time, or will the site be ported as is? Will you outsource implementation of the CMS or use in-house staff? Will your process require new staff to

support the site? Try to think through as many issues as possible before making software decisions.

- *Avoid scope creep.* Make sure you have defined the scope of your project as fully as possible. Especially if you are working with an implementation consultant, make sure that both you and your consultant are clear on the limitations of the project.
- *Partner with vendors who will be there in the future.* The dot-com bust has taught us all that the technology industry is volatile, if nothing else. Companies come and go, and some products with them. Partner with someone you trust will be there tomorrow.
- *Don't forget other types of content.* Even before we finished the implementation of our Internet site, users were requesting locations for content dedicated to internal and specific external audiences. Consider in advance how your CMS will be involved in accommodating those requests. Also, think about other types of content, like e-mail messages, electronic and printed documents, multimedia productions, col-

laboration results (such as instant messaging text, white board text, and videoconferencing sessions), and whether these need to be factored into your plans for a CMS.

- *Plan in advance to evaluate your results.* The bottom line is, Does it work? Is your navigation structure more intuitive? Does your new graphic design appeal to your target audience? Have you reduced your support costs? In general, have you achieved the outcomes you defined for your CMS? We recommend including funds in your project implementation budget to evaluate your results.
- *Know your audience.* Be sure you know your intended audiences and the relative priority you will give each one. Gonzaga identified at least five major audiences, but chose to give top priority to prospective students. Decisions about graphic design, architecture, navigation, and other issues inevitably involve making compromises and choosing among alternatives. Knowing your audience can make those choices easier and more justifiable.

Vendors, Vendors Everywhere

Choosing a vendor can be one of the most difficult parts of the CMS implementation process. The Google Directory lists nine categories and 589 Web pages under "Content Management," and Yahoo's list is similarly large and confusing. The list below is in no way comprehensive, nor should it be seen as an endorsement of any of the vendors listed. It is, however, a place to start your search.

Enterprise Vendors. These vendors offer feature-rich, scalable, enterprise-ready applications with functionality focused on the needs of large enterprises. Many include document and knowledge management tools, published application program interfaces (APIs), back-end integration, and other high-end functionality. These products also generally cost the most to purchase, implement, and maintain.

- Documentum: <<http://www.documentum.com/>>
- Interwoven: <<http://www.interwoven.com/>>
- Vignette: <<http://www.vignette.com/>>

Web Content Management Vendors. Web content management focuses strictly

on managing Web content rather than on managing other forms of content such as documents, images, and multimedia.

These vendors provide more focused, limited software that usually costs significantly less than full-featured products.

- Microsoft Content Management Server: <<http://www.microsoft.com/cmsserver/>> (Microsoft could be included in the enterprise vendor list, particularly if its Content Management Server is paired with its SharePoint Portal Server)

- RedDot: <<http://www.reddot.com/>>

Frameworks. If you want to consider building your own solution, several software vendors offer a range of tools to build a custom site.

- Macromedia Spectra: <<http://www.macromedia.com/>>
- Macromedia ColdFusion MX: <<http://www.macromedia.com/>>

- NetObjects Fusion: <<http://www.netobjects.com/>>

Open Source. For those interested in open-source solutions, several applications and frameworks are available.

- Zope: <<http://www.zope.com/>>
- MidGard: <<http://www.midgard-project.com/>>
- Cofax: <<http://www.cofax.org/>>
- cmsInfo: <<http://www.cmsinfo.org/>>

(general information about open-source content management tools)

Low Budget. Finally, for those who don't see a full CMS in the cards, consider Contribute, the new application from Macromedia. Contribute is a client-based utility that allows Web managers to build templates for Web content creators and structure content to control design, security, and other basic issues without requiring a full-fledged CMS.



firm for assistance with the configuration, customization, and implementation of the CMS. They were instrumental in helping to envision and to define the variety of templates that would be required within the site, and to quantify the system customization the university's vision would require. They then created most of the system templates and wrote the custom code to perform the extra functions identified.

The university's Web Redesign Committee, a group of decision makers from throughout university, was critical to the project's success and oversaw events from start to finish. By consistently monitoring the work of

both the educational marketing firm and the implementation firm, the committee ensured that the project stayed focused, on time, and on budget. The committee also communicated regularly with the university community and helped manage the diverse range of expectations. In addition, the committee established initial policies for implementation and helped ensure a smooth migration to distributed content management.

Two important organizational factors were also critical to the success of the redesign and restructuring effort. First, the design and structure of the previous Web site had not changed significantly in more than three years.

The university community generally recognized that the Web site needed significant changes, both in design and in content management. They were prepared for and welcomed the shift in responsibility for content from a centralized to a decentralized content management approach.

Second, the organizational nature of Gonzaga, and of universities in general, made a CMS attractive. Most universities are defined by decentralized and independent academic and administrative units, yet face a need to present a coherent, effective marketing presence to their current and prospective customers. Web CMSs present the best of both worlds: they give the peo-

ple who know the content control over it, but retain the university's ability as an enterprise to define a look and feel consistent throughout all or parts of an entire site.

The Web Redesign Committee continues to function today as a steering committee. One of its primary functions is to develop and enforce policies regarding the Web site. For example, all program directors believe their program should receive recognition on the home page. The committee has developed a policy for what should appear on the home page, evaluates requests, and determines inclusion. This process takes the current Web manager out of the line of fire. With the weight of presidential appointment behind them, members of the committee are perceived as the true decision makers. This committee has also assumed responsibility for future changes and enhancements to the site, including the development of an intranet Web site and portal.

Although a full and complete return on investment has not been calculated, we are confident that it is positive. The part-time Web developers hired by individual departments have all disappeared—the CMS application renders them obsolete. Staff members in each department have taken over content creation and management. Most of the content is already available in one form or another and is easily transferred to the Web. Staff training time has been minimal, lasting only an hour, with occasional refresher courses. The Web manager advises staff on more complex problems.

The university still has only one full-time Web manager, but there has been a shift in job focus. Most of the Web manager's time is now spent developing more specialized Web applications, such as online directories and bulletin boards, and managing the application. Before the CMS implementation, most of his time was spent on site development and content management. Moreover, he is no longer the target of frustration and anger over delays in Web page development or deployment.

Conclusions

Gonzaga's experience was probably typical for most institutions trying to make such foundational changes in a core function—a combination of planning and fate. The design and implementation of our first Web site was right for the time and circumstances. The World Wide Web was evolving, and the eventual level of penetration of the Web into both the workplace and the home was difficult to foresee. Gonzaga's initial Web site and the structure for maintaining it soon proved inadequate.

The start-up site generated a strong institutional culture of adaptation as different offices, including the Web manager's, struggled to meet ever-increasing demands. Yet all cultures—even dysfunctional ones—are resistant to change. Despite the complaints and frustration the site generated, people had grown used to their roles in developing and managing the site and were reluctant to relinquish them. Only when frustration reached a crescendo was there sufficient motivation to produce real change.

The university was fortunate, too, in the significant growth in the Web site's role in communicating with important constituents. Like most institutions of its size and position, Gonzaga has limited resources. Site development and maintenance have always competed for funding with other initiatives. The site's increasingly central role as an ambassador for the university made significant investments in its development important.

Preliminary results suggest that the redesign and new process have been well received both by content managers and by site users. More than 150 content managers have assumed responsibility for some portion of content on the site, and those managers are finding new and exciting ways to use the site. Departments with disparate responsibilities are collaborating to enhance their Web presence by sharing resources and ideas. One computer lab manager updates his home page on a daily basis to post new announcements to lab users.

Suggested Reading

- L. Gay and J. Robinson, "Content Management: The Quest," presentation at the 2001 CUMREC Annual Conference, <<http://www.educause.edu/ir/library/pdf/CMR0132.pdf>>.
- C. Lester, "Breaking Down Silos," EDUCAUSE Effective Practices and Solutions, 2001, <http://www.educause.edu/ep/ep_item_detail.asp?ITEM_ID=33>.
- L. Bills and J. Cheng, "Managing the Library's Subject Web Pages Without HTML Coding," presentation at the 2001 EDUCAUSE Annual Conference, <<http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0106>>.
- S. Goodwin and R. Vidgen, "Content, Content, Everywhere... Time to Stop and Think? The Process of Web Content Management," Computing and Control Engineering Journal, Vol. 13, No. 2, 2002.
- M. Bronder, "Demystifying Document Management: Navigating the CMS Software Marketplace," October 2002, <http://www.kmadvantage.com/docs/km_articles/Demystifying_Document_Management.pdf>.
- N. McCluskey-Moore, "Untangling Web Content Management," Intranet Journal, Apr. 18, 2000, <http://www.intranetjournal.com/articles/200004/im_04_18_00a.html>.
- CMSWatch Home Page, <www.cmswatch.com>.
- cmsInfo Home Page, <www.cmsinfo.org>.

Directories of Content Management Web Sites

- "Content Management" Google Web Directory, <http://directory.google.com/Top/Computers/Software/Internet/Site_Management/Content_Management/>.
- "Content Management" Yahoo Commercial Directory, <[http://dir.yahoo.com/Business_and_Economy/Business_to_Business/Communications_and_Networking/Internet_and_World_Wide_Web/Software/Development/Content_Management_Systems__CMS_/](http://dir.yahoo.com/Business_and_Economy/Business_to_Business/Communications_and_Networking/Internet_and_World_Wide_Web/Software/Development/Content_Management_Systems__CMS_/>)>.

The School of Engineering, working with the Office of University Relations, is using its Web page to increase participation and involvement by engineering alumni. New uses for the system are appearing almost daily on the site.

Significantly, implementation of the CMS has allowed the Web staff to respond much more quickly to requests for visibility on the site's home page, especially since the steering com-

mittee structure has provided a forum to make home-page decisions. This has resulted in the ability to promote events and activities in a new and very visible way that was impossible under our old structure.

Site users also seem to appreciate the changes. Year-to-year statistics indicate a consistent increase of more than 40 percent in site visitors and page views, and site feedback has been generally positive, both about design and con-

tent. The community's reception of the new Web site has been phenomenal. Comments about the new look and feel and the ease of maintaining up-to-date content have been overwhelmingly positive.

The migration of content to the new site has proceeded more slowly than we would have liked. In fact, the Web Redesign Committee pushed ahead with the release of the new site without all the content in place, fearing that the site would never be "done." In the end, however, that is a large part of what the new site is all about. The provision and maintenance of content is now in the hands of departments, and the burden is now theirs to make sure content is posted and current. *e*

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