

**Chapter 7**  
**Portal Technology Opportunities, Obstacles, and Options:  
A View from Boston College**

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**Web Portals and Higher Education**  
**Technologies to Make IT Personal**

Richard N. Katz and Associates

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# Portal Technology Opportunities, Obstacles, and Options

## *A View from Boston College*

Bernard W. Gleason

The institutional information portal should be treated like a jewel in the crown. Every college and university has two very valuable assets: identity or brand name—such as Boston College—and loyal constituents—for example, alumni, students, parents, staff members, and prospective students. These assets need to be protected, and for this reason, Boston College concluded early on that the ownership and control of the institutional information portal would not be relinquished to an outside agency. One reason for reaching this conclusion is the desire to keep the portal free of commercialism. But a more important reason is that the institutional information portal is a key ingredient in the strategy and technical framework for transforming the university Web site into a customer-centric design.

There is great interest in institutional portals because the portal promises to be the user-elected point of entry that will provide all constituents with a single, personalized Web interface with all information and application resources in a secure, consistent, and customizable way. The portal also promises to be the means by which multiple devices and access methods can be used to provide access to new forms of information and new types of activities—providing convenient access to all appropriate information resources in an integrated manner anytime, anywhere.

Boston College has been an innovative leader in providing user access to personal information and to secure self-service transactions.

As we employ new advances in Internet and Web technologies, the focus is going to stay on self-service, but with an added dimension of full-service. The flexibility and scalability of the architecture of the institutional information portal is going to provide for the continuing evolution and inclusion of new capabilities—particularly e-business, e-learning, and the outsourcing of internal business process functions on an application-by-application basis. To meet these requirements the portal must ride on top of a middleware software infrastructure that will integrate and broker services to all applications for all users in a consistent manner (see Figure 7.1).

The institutional information portal is as important to the Web application architecture as the browser is to the client interface.

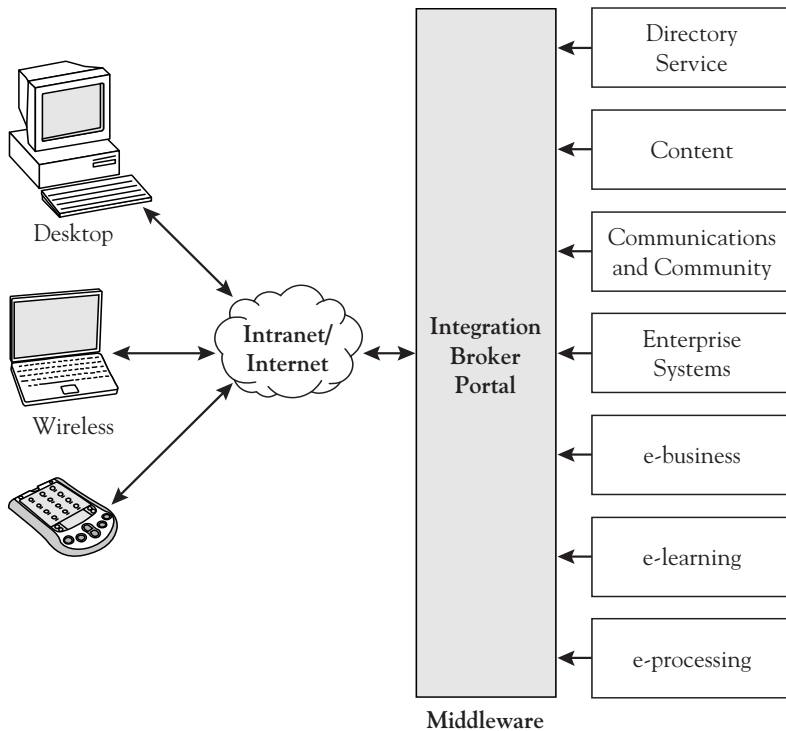


Figure 7.1. The Institutional Portal

The browser provides a common client and the portal provides a common framework—a framework that is based on an open architecture and is available to all applications to provide standard interfaces. The portal must be free and available to all constituents, just as the Web browser is free and available to the client on every desktop; there cannot be any fiscal impediments to customer participation. All constituents will have seamless access to all appropriate applications through a common portal framework without concern about the location or the operating environment of the application.

The emergence of the Internet and Web access to all university services will force institutions to rethink everything—from institutional image to systems architecture, new business and instructional models, and the information technology organization. As institutional leaders and technology experts, we need to step back, reflect, and think, and we need to take a university-wide perspective, with an eye toward the future. Moreover, we need to educate at all levels of the institutional management. The institutional information portal is going to be at the center of the transformation, but we cannot have a portal strategy unless we also have an institutional Web architecture and strategy—one with a “Big Picture” enterprise view.

In 1999, approximately twenty institutions possessed of a common vision of an open architecture to support customer-centric services, and recognizing the need both to protect their institution’s image and to exploit the potential of the portal, joined together to form the Java in Administration Special Interest Group (JA-SIG). Since that time, institutional volunteers have been working actively and collaboratively to create a common portal reference framework called uPortal.

This chapter focuses on the strategic role of the common portal reference framework in the institutional Web architecture and will investigate the related management and institutional image issues.

## What Is an Institutional Information Portal?

Institutional information portals in the commercial world are referred to as enterprise information portals and are derived from their more global counterparts (for example, Yahoo! and Netscape), which aggregate information from disparate sources. In an academic setting the corporate stigma is removed by substituting the word *institutional* for *enterprise*. Institutional information portals are applications that provide all members of the community with a single, intuitive, and personalized gateway to access and integrate campus-specific information, which is stored in the campus databases and systems, with externally stored information.

The campus Web site may be viewed as a collection of thousands of pages or department Web sites, but a portal is a collection of many applications, which are treated as separate channels. The portal provides a common entryway to many different applications with their own unique appearance and navigation. In the illustration in Figure 7.2, the boxes and labels are customized and personalized applications that will execute within the portal.

The mock-up in this figure is intended to provide a way to grasp the concept of all relevant information and services being delivered in a personalized and coherent form to an individual and to visualize possible functionality. It is only an illustration, and readers



Figure 7.2. Institutional Information Portal Mock-Up

should not expend any time critiquing layout, colors, navigational structure, or content.

Initial implementations of campus portals were restricted to specific groups (such as students only) and to generally available information services (such as news and weather), communications (for example, e-mail), and online communities (for example, chat). Over the past few years colleges and universities have taken portals one step further and have begun to provide forms processing capabilities and secure access to enterprise systems (such as student and human resource records) and other personal information resources (such as calendars). Institutions are now faced with the challenge of providing expanded integrated capabilities, defining how the portal fits with the rest of the campus Web environment, and resolving the seemingly conflicting architectural designs of a customer-centric portal and the hierarchical structures of the traditional university Web site.

The portal requirements for secure services and integration are the same as the concepts for business-to-customer (B to C) e-business applications: single sign-on, cross-authentication and authorization across all applications, integration of all communications capabilities (such as e-mail) with applications, and seamless integration of all applications, regardless of whether the application is hosted on campus or off campus. In a campus environment, B to C could refer to business-to-constituent. As we move forward, our customers—all of our constituents—are going to expect that all information services will be accessible via the Web in a personalized and integrated form. We know generally where we need to be; it is now a matter of plotting the right course.

## **Institutional Web Strategy**

The institutional information portal is at the center of the institutional Web strategy, and it represents a different way of organizing and structuring information based on the way in which individual constituents will want to interact with the university. The portal is

not a silver bullet; it is a complementary component of the total institutional Web design, and it needs to be viewed as an integral element, not just as some add-on or as a competing technology. The portal represents a change in institutional philosophy in the delivery of services and a major shift to a customer-centric (portal-centric) design. In a portal-centric structure, the customer is the “star.” Content and services are structured so that all constituents will use the portal as their prime entry point.

As shown in Figure 7.3, there are three main content views of the institutional Web architecture.

### **Public Web Site**

At an institutional Web site, the top page, or institutional home page, is the primary entry page for external visitors and the general public. The top page sits at the top of the hierarchical organization of Web pages, and that view is presented in a structure defined by divisions, schools, departments, units, clubs, and so forth. Although each of these layers of the hierarchy may have a unique design, it is expected that the design and navigation of pages within a layer will be consistent. Traditionally, the coding and the management of content have been decentralized, with a loose linkage of all the components of the hierarchy. Because the pages are designed to service the general public, most information is not confidential and all content is available to everyone.

Colleges and universities are aware that the institutional Web site is now a major component of the institution’s mass communication, marketing, recruiting, and fundraising efforts, and institutional image on the Web is an important consideration. It is now likely that the information on the Web is reaching a larger audience than are traditional print publications. At Boston College we have over one million visitors per month to the public Web site. The quality and accuracy of the presentation, as well as the organization of information on the public Web site, must now attain the same high standards as institutional print publications, and there is now

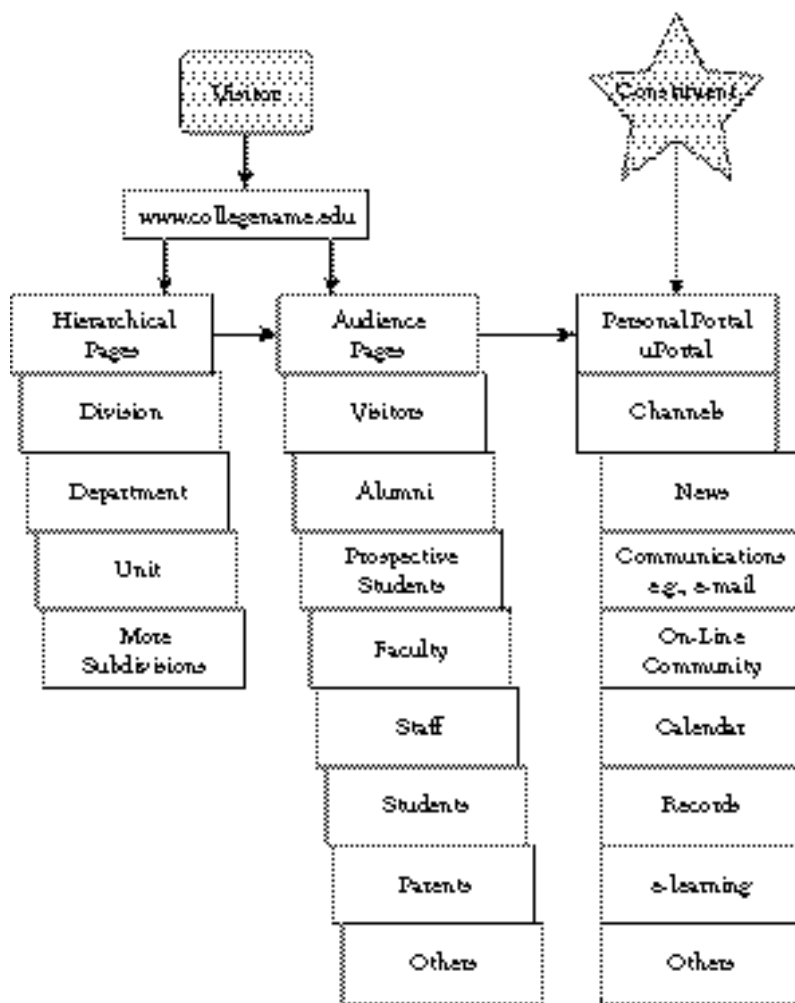


Figure 7.3. Three Main Content Views of Institutional Web Sites

a requirement to apply a consistent appearance and navigation structure across all of the top-layer pages of the institutional Web site.

The public institutional Web site contains two general categories of pages: institutional and personal. The institutional pages are the pages that represent the official hierarchy and policies of the university. For example, the home page of the chemistry department

and the admissions policies of the law school are institutional and should therefore conform to the institutional image, content design, and navigation strategy. But fraternity home pages and faculty personal Web pages do not need to conform.

### **Audience Pages**

An institutional Web site is likely to contain thousands of individual Web pages, but only a segment of the total information content is pertinent to a particular visitor. For example, information regarding some internal operating procedures would not be of interest to a prospective student. From within the public Web site, constituents are able to self-elect a grouping (such as student, alumni, or faculty), and information content and navigation is customized for the designated audience. Visitors can link to any of the audience pages; they are not secure. For example, a prospective student may wish to experience the view of a matriculating student.

Each external audience or constituency usually has a specific, information-only audience page. For example, there are separate audience pages for parents, faculty members, and students. These audience pages all have a similar format and use the same consistent interface design and navigation scheme, and there is redundant general information as well as audience-specific content. The top page of the public Web site is designed for the external audience and casual visitors, and in this sense the top page of the institutional Web site is the “external” audience page. These audience pages will also contain instructions and a means for logging into a personal portal (institutional information portal) in order to access personalized, customized, and secure information and transaction processing capabilities.

### **Personal Portal**

The personal portal takes the concept of audience pages a couple of steps further. The first and most important part of this architectural concept is that constituents log in to the portal to identify

themselves. At Boston College all constituents (such as students, alumni, and parents) will authenticate against a central directory service called the lightweight directory access protocol (LDAP) with a combination of any standard Boston College identifier (eagle number, social security number, or user name) and personal identification number (PIN). All constituents will be given credentials as soon as they are identified as an entity within the university.

Constituents will be easily enticed to log in because the portal log-in is standard; there will be nothing new to know or remember, with no new passwords or different passwords for every service. Individuals may belong to multiple constituent groups (that is, the same person may be a staff member, a parent, and an alumnus), but he or she will only have one set of credentials—same ID and PIN and a single e-mail address. Providing credentials for everyone develops a greater sense of belonging to the BC community.

The directory service also contains profile information, access control privileges, and preference parameters for each person, so that the information content can be filtered for the specific individual in a secure and individualized manner. The only viewer of a personal portal page is the owner, so the issue of institutional image is irrelevant. The portal is customized to the individual, and functionality and convenience to the customer are the most important design considerations.

Access to secure services will not always be executed by logging into the personal portal. In instances when it makes sense to access a secure service from the public Web site or the audience structure, the application will continue to use the functionality of the portal infrastructure for directory services (authentication) and integration. For example, Figure 7.4 shows a sequence of screen shots depicting how an alumnus entering the alumni association audience page could access secure on-line alumni community services that are hosted at a remote location.

This example demonstrates the application of the requirement to extend the institutional identity and image across the entire

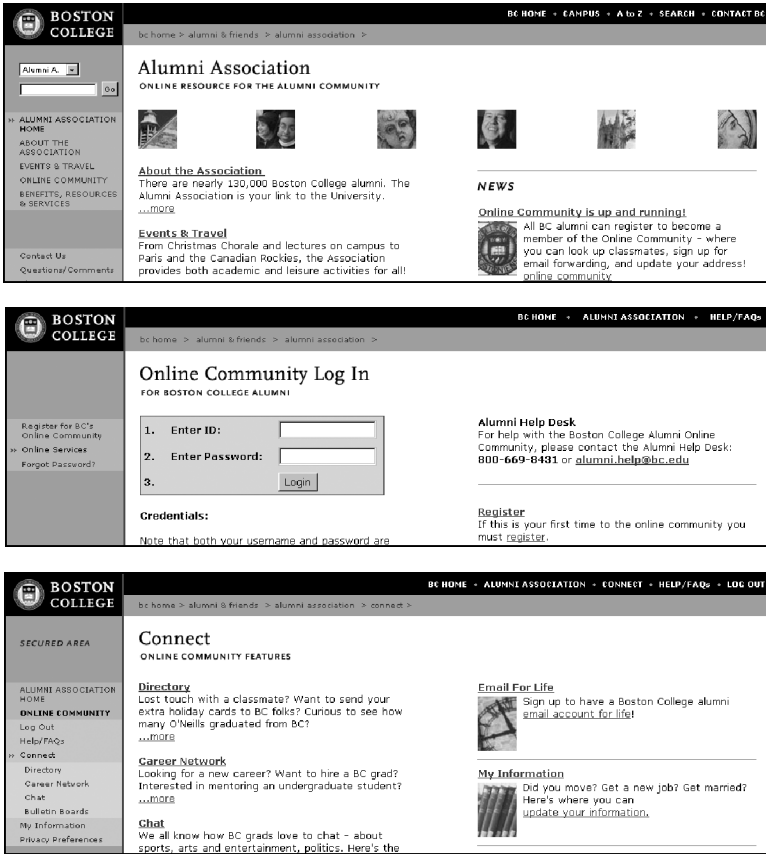


Figure 7.4. Example: Audience Page Links to Secure Service

design of the institution Web site, providing the customer with a high-quality appearance and a consistent navigation structure.

Newly integrated Web applications will cut across department lines and present information from multiple sources in a single presentation layer that is convenient for the customer. For example, a fully functioning student registration system would integrate data and present content from multiple sources and processes. The challenge for application developers will be to manage the content and services so that the components will mesh operationally and logi-

cally. The portal structure is an appropriate means of pulling these dispersed data sources together.

Audience and personal portal pages provide a needed virtual facility that is not always accommodated by the institutional hierarchy. For example, there is probably not an Office of Parents in the university hierarchy, but there is a need to organize and present information and services to parents in a meaningful and unified format in both audience pages and personal portal pages. Information on a personal portal page for individual parents may range from general campus news to proxy services to access their child's student account, to opportunities for making contributions to the university's capital campaign.

## **uPortal—Common Portal Reference Framework**

At many colleges and universities there are multiple independent portal projects in process, and there is poor coordination, an absence of a standard technology architecture, and little managerial insight and control. This disjointed approach has resulted because there is no clear-cut definition of an institutional information portal and there is no technical guidance that will help software vendors and their customers build these information portals. At an early meeting of the JA-SIG, a discussion of portals and Web strategies was characterized by one of the institutional representatives as a "group therapy session." All the participating institutions were experiencing similar issues and consequently there were opportunities for common solutions.

The participating colleges and universities banded together to define a common portal reference framework—uPortal. The working group stipulated that the common portal reference platform must do the following:

- Provide access to all information and services through a single graphical interface

- Support a single log-on to obtain authentication and authorization to all information resources and applications
- Provide a framework in which all elements of the university (academic, administrative, and community) and all business applications can be integrated
- Provide a convenient set of communications services that are Web-based
- Provide a one-stop place where all members of the university community can perform all business transactions
- Provide the ability to present information and access to services on an individual basis in a personalized manner
- Provide each member of the community with the ability to customize the appearance, layout, and information on an individual basis
- Grant to the university full control and self-management of appearance and content
- Be vendor-independent (not locked into proprietary hardware or software)
- Be free of commercialization (no advertising or selling of products unless university-sponsored)
- Be available to all constituents twenty-four hours a day, seven days a week
- Be flexible and able to absorb new technology advances and new applications

The objective of uPortal is to provide a common framework and a set of channel standards to which application developers and com-

mercial application vendors can write a standard, one-time-only interface. The first version of uPortal, which is available free of charge to all colleges and universities, was released in July 2000, and the beta version of uPortal 2.0 was released in late July 2001. The production version of this second release was scheduled to become available in November 2001. A number of other institutions are considering the adoption of uPortal as the institutional information portal framework and are undertaking appropriate evaluations of this tool. In October 2001, Campus Pipeline announced their adoption of uPortal as that company's portal framework.

### **What Are the Alternative Portal Strategies?**

The topic of portals is "hot" on every campus, and information technology planners everywhere are busy sorting through the options and devising strategies for their institutions. For the sake of discussion, the options have been separated into the following groupings:

- Higher education portal vendor
- Enterprise resource planning (ERP) vendor
- Portal vendor with ERP affiliation
- Course Management System application vendor
- Portal software vendor
- In-house developed vendor (for example, Agora)
- Open source provider (for example, uPortal)

Over the past couple of years, colleges and universities were inundated with vendor proposals to provide their rendition of a campus portal at no charge to the institution. These portal vendors created hosted portal sites that were geared to the higher education market, and they derived their revenue from selling advertising banners or

including prominent links to sites, which in turn sell products. These vendors marketed these so-called good deals to individual units within the campus in an attempt to get a foot in the door. The major marketing pitch of these vendors was that it would be too expensive for an individual institution to develop an enterprise portal on its own.

For smaller institutions, for some divisions within universities, or for some institutions that are only concerned about a limited population (for example, just students), the higher education portal option became an attractive short-term tactic. These institutions were able to become early adopters quickly with very little financial impact. At the same time, they surrendered control of the institutional image and constituent base. These institutions also tied themselves to a potentially unstable technology base and to a business model that may not be viable. For larger and more diversified institutions that are seeking an enterprise solution, affiliation with one of these vendors is not advised.

Enterprise resource planning vendors have entered the portal arena by offering products that integrate tightly with their ERP product offerings. These vendors, such as PeopleSoft and SCT, are building partnerships with a variety of content providers and profess to be building these products to be open. If an institution has the full range of application systems from a particular ERP vendor, it may also make sense to select the complementary portal product. This approach may of course lock an institution into a single proprietary vendor and establish dependency on a single vendor, whose interest may be more focused on growing market share than on serving the best interests of the university. An alternative and perhaps better long-term strategy is to employ a completely open portal that is part of the institution's middleware tier and separate from its back-end systems.

There is another group of vendors who are really the same as the ERP vendors. These vendors, most notably Jenzabar, started out as higher education portal vendors offering such community services as e-mail, chat, and news—and then they realized that they needed

to address the customer demand for tighter linkage and access to institutional data systems. These vendors have in effect linked the portal with a suite of back-office software. With the acquisition of four back-end data system vendors—CARS, Quodata, CMDS, and Campus America—Jenzabar has chosen to solve the problem of gaining instant access to a customer base by attempting to meet the portal integration requirements of the users of these application systems. The institutions in this market segment are most often smaller colleges, which are more likely to relinquish some control of the portal framework for ease of implementation and management. For the same reasons previously cited for the ERP vendors, vendors in this category may not be an advisable selection for most large universities.

Many application vendors, particularly in the course management area, have been forced to create or license a portal framework to support their operating environment. Out of necessity, these application vendors, particularly Blackboard, have positioned their product set to be the campus portal solution. These course management vendors are on a similar strategy track as the portal designers; each is attempting to build and deploy an enterprise solution—the solution that will be used by everyone and will be completely Web-based. These application systems need an underlying portal component in their architecture, but the application system should not be the institutional portal unto itself. The application system should ride on top of an institutional information portal framework.

The pressure is on the application systems vendors to produce enterprise versions that integrate with the rest of the institution's information data sources and acquire basic authentication and authorization services from an institutional portal. Increasingly, vendors, out of necessity and from a vendor cost advantage, are supporting and adopting open systems efforts, such as uPortal. At the very least, these application vendors will need to provide compatibility between the application portal (for example, Blackboard) and the institutional information portal (for example, uPortal). In the future,

the commitment by an application systems vendor to open integration will be a precondition for selection of enterprise application products.

A pure portal vendor, such as Plumtree, is another alternative for colleges and universities to consider. In fact, if institutions cannot wait for an acceptable production version of uPortal, or if the uPortal initiative is not successful, then the selection of one of these pure portal vendors would be going in a logical direction. One of the problems we faced in dealing with commercial software vendors was pricing structures and a lack of orientation to the higher education market. In the case of portal software that is going to be used by hundreds of thousands of constituents, when alumni and prospective students are considered, the per-user pricing models will never be acceptable.

JA-SIG launched the uPortal initiative because there was consensus among major university information technologists that there existed a need for a common portal reference framework—a framework that is based on open systems standards, is open-source, is free to all institutions, and is designed for higher education. By acting collectively and collaboratively, JA-SIG member schools are able to reduce costs and facilitate sharing, as well as consolidate the combined influence of most of the prestigious colleges and universities. For vendors, this initiative creates a strong inducement to provide a single, standards-based interface with the uPortal framework, thus eliminating further institutional integration costs. At the same time, institutions will be able to retain their individual identities and total control over their institutional Web sites.

Many universities are in a similar position in evaluating options. Should they wait on uPortal, develop an in-house institutional information portal, or adopt a commercial portal product? At Boston College our strategy is to continue to develop our internal portal, Agora (which has been in existence for about three years), to look to uPortal as the long-term solution, and to aggressively support the

efforts of JA-SIG. If the uPortal initiative fails, then we will need to use an alternative method—either adopt a commercial portal product or continue to use Agora as an interim solution. In any case, our strategy is to own the portal and never consider turning the portal over to a third-party vendor.

## **Selling the Importance of the Portal Strategy**

As designers and developers of the institutional information portal, we need the assurance that the enterprise approach is approved and accepted as an institutional strategy. We also need to alert and educate the institution as to the importance of the institutional information portal. But selling architecture is a lot harder than selling solutions. Business people want to see a working system, not a great conceptual design. Institutions are not adopting institutional information portals because they are impressed with underlying technology; in most cases they don't care about technology. Executives need a sound business strategy—one that is based on function and cost, not technology.

The most important question may be this: How do you get the highest levels of management focused on a set of interrelated strategies that are too complicated for most executives to understand but are critical to the central communications functions and operations of the university? Expecting executive management to grasp the technologies is unrealistic. Instead, we need to frame issues so that they appeal to the basic instincts of all good decision makers—such instincts as intuition, common sense, and the urge to be the best.

The traditional role of senior management of the university is to set and nurture long-term goals and strategies. The strategies include such areas as long-range fiscal planning, enrollment management, master planning for campus buildings, and athletic programs. In each of these examples the university has placed responsibility and trust in the hands of a knowledgeable individual or organizational unit. The

same high-level, institutional focus should be applied to the Internet and the Web. In the unified adoption of Internet technologies and the Web, the role of a vice president, dean, or senior manager should be one of supportive endorser, not uninformed defender of individual or local interests.

## **Leadership and Institutional Issues**

The institutional Web site is composed of integrated and interrelated pieces that are part of one giant system, and institutions need to recognize the impact and requirements of the central management of a distributed environment. The information technology leader needs to pursue the following objectives:

- Establish the institutional leadership for Web development and management
- Get the institutional Web and portal strategy defined, understood, and endorsed
- Establish the integrated Web architecture to support the top-down, enterprise model
- Clear up the roles of individuals within information technology and operating units on campus and establish a commitment to executing those roles
- Establish a central resource unit for the definition of standards and the ongoing management and monitoring of the institutional Web site
- Determine and orchestrate the rapid transition of the current Web environment to the institutional model for the future
- Eliminate the need for skilled, costly technicians to maintain Web content

Leadership in the development of the institutional Web strategy requires the full-time assignment of a single individual or a small, informed group of individuals. This leadership should provide a strategic, university-wide perspective on the role of the Web, in order to conceptualize the entire Web structure and information flow and to apply the proper technologies to meet the needs of the Web strategy. The current practices of disjointed planning and decision making can no longer be tolerated if an institution hopes to tap the real power and promise of the Internet and the Web to enhance the institutional image and to positively change the way in which the university functions.

The challenge of creating an institutional Web architecture can be summarized in two words: infrastructure and integration. When we line up the potential business projects that may be addressed using Internet and Web technology, we are likely to encounter the following questions:

- How do we develop a portal strategy if we don't have the required technology infrastructure in place?
- How will new Web applications be integrated with existing back-end legacy applications, such as PeopleSoft and in-house-developed enterprise systems?
- Will a new Web application use existing security services—such as authentication and authorization, or will we have to create a new set for every new application?
- How will new applications exchange data with new existing applications and existing databases? Will we have standard procedures or will we have proprietary interfaces for every new application?

- Where will each new application fit into the larger picture? Where is the application located on the institutional Web site and how does one get to it?

These questions and many more like them quickly lead knowledgeable technology architects to the obvious conclusion that there must be a common software infrastructure and that there must also be a common set of integration standards. Without a common framework and standards, there is chaos with very expensive and ineffective support costs.

Information technology staffs now need to focus effort and resources on the software infrastructure and the middleware layer to support systems and service integration, particularly the integration of Internet and Web services. There is also a need for corresponding change in the organizational structure and for the establishment of a separate unit composed of developers and innovators who possess in equal parts technical and soft skills (see Figure 7.5).

The responsibilities of the Internet services group are the following:

- Provide the vision and institutional leadership on campus for Internet and Web development and provide the single focal point for decision making

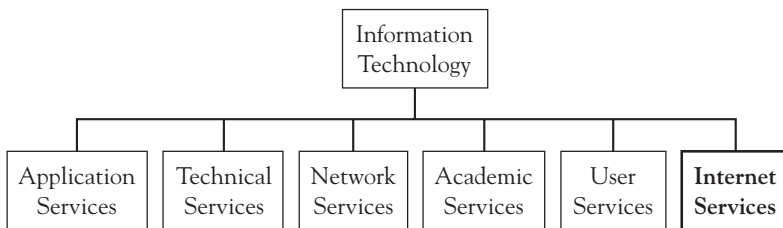


Figure 7.5. Information Technology Organization

- Develop the institutional Web strategy in conjunction with the university community and manage a top-down approach to design
- Build the institutional technical framework into which all Web applications will fit, and create and enforce the rules for integration of all applications
- Implement the software infrastructure and development tools to support an effective institutional Web site
- Provide leadership to the rest of the development community in the use and deployment of new technologies and directions (such as e-learning and e-business)
- Protect the institution's multimillion-dollar investment in existing systems and integration services (for example, single log-on, directory services, and role-based authorization)
- Ensure that the university is protecting the future and eliminating cost by adopting products and techniques based on nonproprietary standards
- Work with potential vendors to adapt products to meet the requirements of the university and open systems standards
- Work with other universities and vendors in consortium and partnership relationships to maximize resources and to leverage collective forces

## Conclusion

This chapter attempts to share directions and personal opinions rather than list a set of issues and possible alternatives. Readers may not agree with many of the personal assessments and approaches, and many of the strategies and directions may not be a practical fit

for another institution. However, sharing ideas is the key to building consensus within campus business and technical units, within the greater higher education community, and with business partners. Information technology leaders need to be prepared to express their views on critical issues such as the role of the institutional information portal in the institutional Web architecture. As we proceed with the inevitable discussions and decisions about the institutional portal strategy in the context of the institutional Web strategy, it is vital that information technology leaders be prepared to articulate the strategy in a comprehensive manner. People at all levels—from department managers to the president of the institution—will respect the depth of knowledge and vision.

It is important to cultivate this top-down, broad view rather than working from or reacting to individual bottom-up initiatives. In this respect, customers are principally interested in functionality and have little regard for the technical (hardware and software) infrastructure and the integration requirements. The result is that infrastructure and integration, to the dismay of informed and professional information technology staff, is being defined by default by the application solution. In most cases, because of this approach to product selection, information technology management is left to deal with the resulting internal human resource issues and very costly and unnecessary ongoing support requirements for these suboptimal systems.

### **Buy, Build, Integrate**

Higher education's information technology professionals are really in the business of stitching things together, and the portal becomes the key integration component. Our customers, who do not either understand or care about the underlying architecture or back-end data structures that accomplish this integration, perceive integration through the so-called presentation layer. This is why the portal is indeed like a jewel in the crown. In this sense, uPortal can be thought of as a portal server; the desired components (channels) are served to the customer through the uPortal framework.