MIT SLOAN SCHOOL OF MANAGEMENT

Due Diligence for the MIT Portal

Final Report

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15.568 Practical Information Technology Management

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I. Executive Summary

In a collaboration between the 15.568 Practical Information Technology Management class and the MIT Information Services and Technology (IS&T) department, a four-person MIT Portal team provided due diligence for an MIT Administrative Portal. Upon studying external universities' portal implementation processes and technologies, the MIT Portal Team analyzed the critical success factors to provide recommendations for the MIT IS&T.

The MIT Portal Team followed a rigorous, consistent methodology for research. First, an MIT Administrative Computing portal case study was written on the current portal stage. Second, an interview template allowed consistent information to be collected across all schools interviewed. Third, the MIT Portal Team formulated recommendations utilizing frameworks learned from the 15.568 class in a successful, one-hour presentation to key IS&T stakeholders.

Four portal implementations case studies were created: Duke University's DukePass student portal, the University of Cincinnati's OneStop administrative portal, MIT Sloan's SloanSpace student portal, and North Carolina State University's My Pac administrative portal.

II. Objective

Project Purpose

- To research existing portal implementations to determine costs, resources, and technologies
- To provide due diligence and recommendations for an MIT Administrative Portal

Project Goals

- To determine resource costs, with specific attention to employee utilization and time
- To identify portal implementation and operational issues
- To document best practices for MIT IS&T's reference when undertaking the project

Class Objective

In the Spring 2005 15.568 Practical Information Technology Management undergraduate course at MIT Sloan, Professor Cyrus Gibson and TA Evan Mamas conceptualized real-life information technology projects with MIT Information Services & Technology (IS&T).

The two-month long investigative project provided a learning opportunity for our four-person team called 'MIT Portal Team' to do internal consulting with the MIT IS&T department. Through biweekly meetings, project management, and external research, the class culminated in a presentation to the MIT IS&T project champions and an executive, and this final report.

III. Background

In August 2004, MIT IS&T's Administrative Computing Department (AD) realized both its administrative gateways, SAPweb and SAPwebss (SAPweb Self Service), had overgrown their initial design. It was AD's first vision of a portal to replace the two old gateways.

Department Background

In 2005, AD was a group within IS&T that exclusively handled IT issues related to administrative functions. The dedicated staff implemented requested IT solutions in an order dictated both by the priority of the solutions and the availability of human resources.

About Portals

Portal development software is often selected for suitability and budget. In developing MIT's new administrative gateway, referred to as "insideMIT", MIT owned the SAP licenses for its current SAP-based administrative systems. Open-source was an option for MIT, but was not yet investigated.

Division Operations

MIT IS&T's ability to complete projects was constrained by manpower and budget. In 2004, the initial portal gateway project had less than one full-time equivalent allocated to it.

The AD websites and gateways must portray the MIT "look and feel" and complement the MIT environment. Thus, packaged software products without customizable user interfaces were less desirable. Additionally, gateway solutions must comply with W3C standards.

MIT Portal Definition

"To provide customized one-stop-shopping for all administrative and self service applications and services. The primary audience for the Administrative Portal is MIT employees, but some applications, such as Student Group Reports, are specifically for students, and others, such as Training, are used by both employees and students."

- September 10, 2004 Migration Requirements guide

Portal Applications

WebMail, TechTime, Transportation & Parking Schedules, Administrative Transactions, Self-Service Transactions, Institute Forms, Institute Announcements, Event Calendars

Gateway Redesign Project

The goal of the new gateway, insideMIT, is to simplify the user experience by only providing the user with features pertinent to their position. Users are categorized into three categories: faculty and students, accounting officers, and general users. Using certificates, insideMIT authenticates the user and offers the relevant features. Additionally, users can customize features seen upon gateway login to maximize efficiency. To achieve this, the old static HTML gateway would be replaced with a new gateway built on portal technology.

Technical Issues

The gateway involves two technologies unfamiliar to the Administrative Computing Development: Web Application Server (WAS), and Java 2 Enterprise Edition (J2EE). Since the rollout for these systems and necessary new employee hires would correspond to the new payroll applications schedule, which also uses WAS, insideMIT must launch no later than January 2006.

An older-than-recommended version of SAP R/3 could be implemented by WAS. Normally, the SAP portal module could be used without additional hardware or licensing.

The groundwork done for insideMIT has been conducted by an AD web development team and an MIT Sloan undergraduate group. In the future, an additional project manager to define analyst and project management roles for insideMIT before its implementation is needed.

IV. **Case Study E**xecutive Summaries

The following four portal implementations of diverse technologies were investigated:

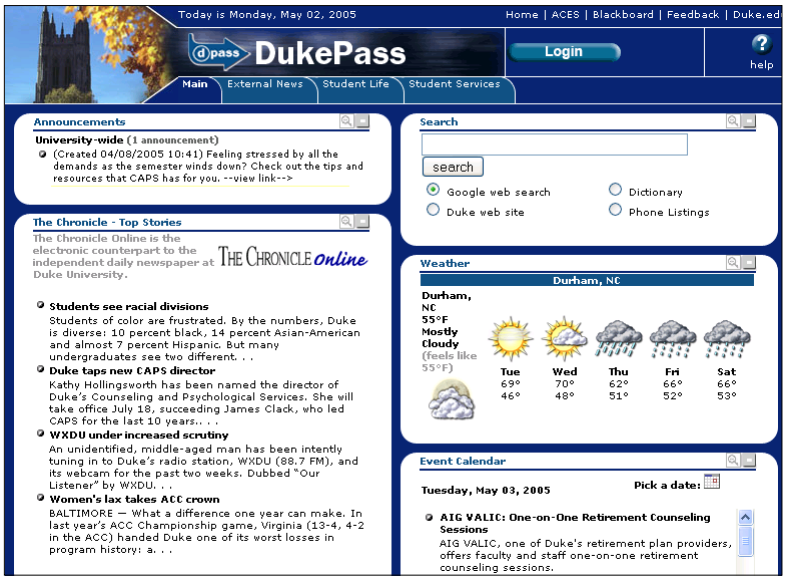
- Duke University's DukePass student portal (uPortal)
- MIT Sloan's SloanSpace student portal (dotLRN)
- University of Cincinnati's OneStop administrative portal (SAP)
- North Carolina State University's MyPac administrative portal (PeopleSoft)

To creating a unique set of case studies for each individual portal, the MIT Portal Team conducted 30 minute to 1.5 hour-long phone and in-person interviews to gain an in-depth understanding of the practical lessons learned. In addition, follow-up interview questions were exchanged via email to present the most accurate information.

The summaries our actual case studies cover: Background, Division Background, Portal Strategy, Operational Costs, Technology Selection, and Portal Implementation

A. CASE STUDY: DUKE UNIVERSITY'S DUKEPASS STUDENT PORTAL (UPORTAL)

Exhibit 1: Duke University's DukePass http://dukepass.duke.edu



Background

On September 4, 2002, the Duke Office of Information Technology held an exploratory meeting on web portals with constituents from nearly all of the major departments at Duke. The group agreed that the time was right to proceed on a pilot portal system.

Portal Strategy

After interviewing seven institutions, Duke focused on gaining the experience rather than theoretically solving portal issues. The project champion, Deborah Johnson, coordinated three teams of stakeholders: student content, service provider, and design & technical. The pilot was implemented in two stages: Phase I – a pilot undergraduate student portal was successfully launched in fourth months from conception; Phase II - the undergraduate portal release, whose success is now the driving force for the graduate, faculty, and administrative portals of the future.

Division Background

The Information Technology Advisory Committee (ITAC) chartered the Web Information Services Subcommittee with nine specific goals: better "portal" definition and the definition of a pilot project. The subcommittee was asked not to develop specific functional or technical requirements for an enterprise portal, or to evaluate specific portal software products.

Operational Costs

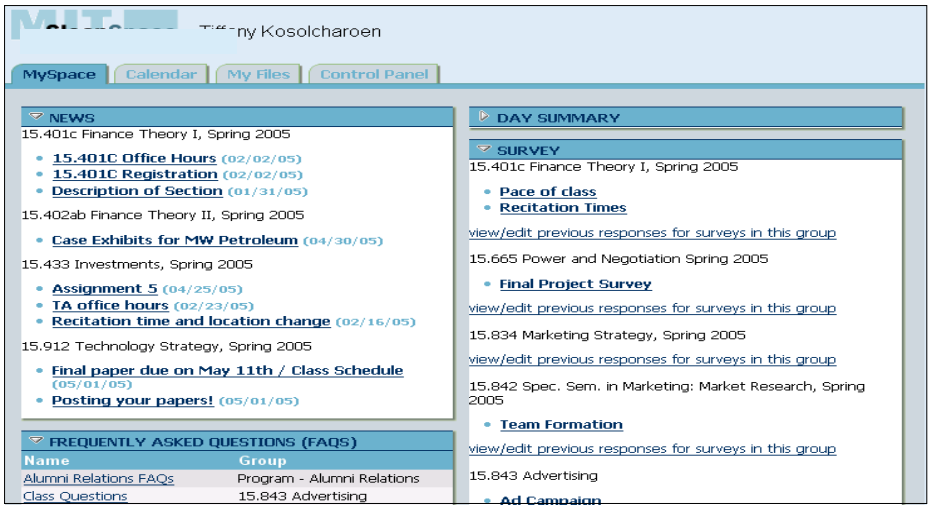
Duke successfully launched its portal with only basic fixed costs. By selecting the uPortal open-source technology, Duke avoided the software licensing fees needed by other portal companies. Duke observed that employees would need to be trained on the new portal and volunteer student groups would need to be coordinated regardless of the technology chosen.

Technology Selection

uPortal open-source software was selected for the student portal. Since no data needed to be transferred, no integration costs existed. Duke University currently licenses SAP systems.

B. CASE STUDY: MIT SLOAN'S SLOANSPACE STUDENT PORTAL (DOTLRN)

Exhibit 2: MIT SloanSpace http://sloanspace.mit.edu



Background

The MIT Sloan School of Management is one of the world's leading business schools. In addition to highly respected faculty and courses, MIT Sloan is also regarded for its advanced research and technology. Therefore, it is no surprise that SloanSpace was envisioned by students who wanted a single site for all their course management needs.

Launched in 1998, SloanSpace's (**Exhibit 2**) first successful prototype compelled Sloan's IT department to develop a full-scale installation. At the time, Sloan had two main options for development: a commercial portal software package or a custom, built in-house software.

Division Background

SloanSpace was originally designed using the ArsDigita Community Education System (ACES), customizable vendor software. The project team consisted of ArsDigita programmers, one project manager, and two full-time Sloan IT programmers. When ArsDigita shut down, SloanSpace went open-source in the form of .LRN (dotLRN).

Portal Strategy

- Functionality: Since an original SloanSpace intent was to create communities and packaged portal software did not offer the capacity to create communities, the user requirements dictated the use of technologies other than existing technologies.
- Upgrade Capability: In addition to being unable to offer desired services, it was doubtful that vendors could offer custom upgrades and enhancements.
- Partnerships: Early in the venture, an MIT professor offered the services of his startup company, ARSDigita. This partnership enabled Sloan IT to create a portal at minimal cost, and ARSDigita to increase its credibility and portfolio.

Operational Costs

The cost savings of .LRN were significant. Although SloanSpace's costs are allocated on an ad-hoc basis, .LRN director Alfred Essa estimates "over five years, we've spent roughly $500,000 to deploy, extend, and maintain .LRN. Our benchmarking suggests we've spent roughly 25% of the cost of similar systems built with commercial software or custom code."[1]

Technology Selection

Although open source .LRN was largely successful, there were several problems. For example, open source's dependence on "volunteer programmers" meant that SloanSpace was unable to depend on these people consistently. However, the benefits were deemed to outweigh these minor inconveniences. As the .LRN community grew, MIT Sloan was optimistic that SloanSpace and other open source portals would benefit from each other.

Portal Implementation

[1] http://www.dotlrn.com/case-study/mit-sloan/

From Spring to Fall 2000, the first SloanSpace release required three months of consistent effort and transition from scripts to QA testing. This first Fall 2000 version of SloanSpace included community and file-sharing capabilities.

Users were generally receptive. Specifically, MIT Sloan's Deidre Kane attributed one key factor to the easy transition: Sloan IT had one fulltime person working to only address user concerns. Because of the openness to feedback, SloanSpace had minimal resistance.

C. CASE STUDY: UNIVERSITY OF CINCINNATI'S ONESTOP PORTAL (SAP)

Exhibit 3: University of Cincinnati http://onestop.uc.edu (portal to be built)

Background

In 2004, the Systems and Operations Division at the University of Cincinnati (UC) realized its mainframe systems had reached obsolescence. To maximize impact and user buy-in, UC realized decided to construct its finance and human resource functionality.

Division Background

The division was staffed through a combination of internal staff members and hired consultants from IBM. To reduce costs and increase ease of upgrade, the division transitioned UC's systems to two commercially-available platforms. Blackboard was chosen for the student portal, while SAP was chosen for the administrative portal. The University defined a portal as: "a one-stop-shopping site where users can access to all the resources they need."

Portal Strategy

To increase initial visibility, the portal strategy was to maximize value-added services at the beginning of the implementation for consumer buy-in. Despite the ease and low costs of system features, staff training costs and budget constraints made some additions infeasible.

Operational Costs

While the final outcome of the administrative portal project upon this case creation, planned budget and staff information was provided. Approximately a quarter million dollars have been allocated to the portal project (**Exhibit 4**). To ensure the portal's acceptance by the community, UC plans to train 950 to 1,100 people by the second phase of the project.

Exhibit 4: University of Cincinnati budget proposal

Category	Item	Cost
Software		**$125,000**
	Windows 2003 SQL licenses	$50,000
	Novell licenses for identity management & eDirectory project	$75,000
Consulting		**$125,000**
	IBM Consulting Services	$125,000
Total		**$250,000**

Technology Selection

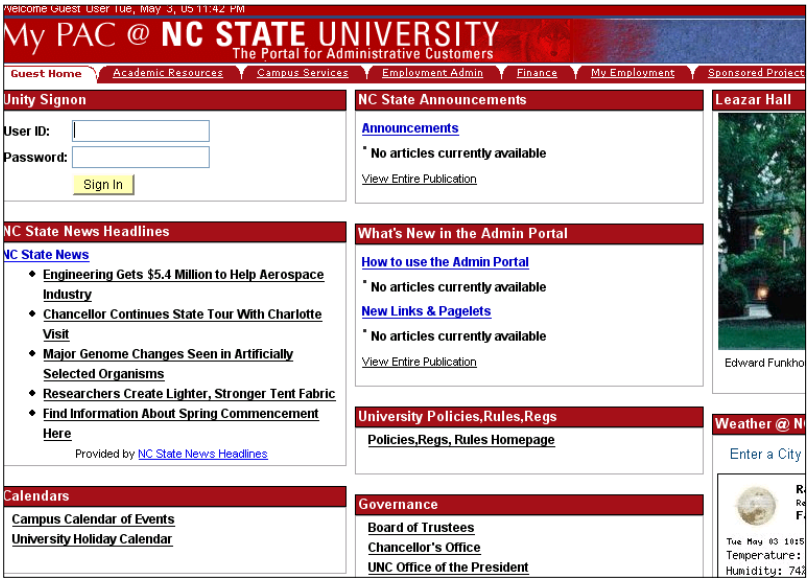
At the time of selection, IBM DB2, the UC database of choice, was not compatible with SAP R/3. Microsoft SQL Server was selected for its maximal ease of integration.

Portal Implementation

The administrative portal implementation was modeled upon the Los Angeles Community College. The goal of the approach was to add maximal value in minimal time. Since building the HR component at the beginning of the project would be too large a cultural change and may have negative repercussions, the financial component will be created first.

D. CASE STUDY: NORTH CAROLINA STATE UNIVERSITY'S MYPAC ADMINISTRATIVE PORTAL (PEOPLESOFT)

Exhibit 5: North Carolina State University https://adminportal.acs.ncsu.edu/PortalEntry.html



Background

The initial focus of the Administrative Portal Project is to provide NC State faculty and staff easy access to administrative web applications and associated information such as help, training, and policies. The driving factor for NC State's PeopleSoft selection was security, for its current systems were all PeopleSoft systems.

Portal Strategy

A two-phased implementation approach was outlined. In its initial roll-out, the focus was to provide NC State faculty and staff easy access to administrative web applications such as HR, finances, etc. The PeopleSoft administrative portal will be fully integrated with the student portal by 2009. Currently it its pilot states, a future permanent provost will be the driving force for new releases.

Division Background

The Administrative Computing group at NC State provides IT support to the student, administration and business units. The group designs, implements, and maintains the technology infrastructure for the various NC State departments using the PeopleSoft technology.

Operational Costs

Cost was the biggest limitation. With a small implementation team of 12 people, one customer-focused team, and 50 key university stakeholders including business officers and general users, NCState needed to its key technical team, which spent the most time working on the portal.

Technology Selection

The hardware technology was on Oracle database servers. The environment for the Administrative Portal is similar to the current HR and Financials 8 systems. It will run on PeopleTools 8.43 and will consist of servers for the database (Solaris/Oracle), application servers (Solaris) and web servers (Solaris/Weblogic), and associated software. NCState's portal licensing costs were reduced relative to other systems because it used PeopleSoft servers.

V. Recommendations with Applications to the 15.568 Practical IT Management class

Each university's valuable lessons learned serve as real, tried-and-true recommendations for the MIT IS&T Portal team. In addition, recommendations will reference 15.568 Practical IT Management class case studies. It is important to observe that the lessons learned at one portal project often have shared critical success factors with other universities' implementations.

A. LESSONS LEARNED: DUKE UNIVERSITY'S DUKEPASS PORTAL (UPORTAL)

1. Money spent and portal success is inversely proportional.

Duke University's Information Technology Advisory Council (ITAC) team conducted its own benchmarking study on the success rates of eight other universities' portal implementations. Upon finding failed portals are highly correlated with high costs of portal software and programming due to "inflexibility of toolsets, costs of third-party licensing and services, monolithic system architecture [resulting in] programming bottlenecks, and large concurrent project development[2]", Duke University selected the free, open-source uPortal software tool and used minimal resources in implementing the portal. Duke demonstrated the notion that software could be treated as a commodity, and thus purchased off-the-shelf and combined into solutions as such.[3] Open source is one step further in the road to commoditization of portal technology.

2. A four-month deadline can be met with unified stakeholders.

Deborah Johnson was the incredible driving force of Duke's low-cost, quick pilot implementation. By coordinating among stakeholders with meetings and tangible goals, Duke was able to meet its deadline while involving students and administrators throughout the decision-making process. A similar conclusion was reached in the AIRNow case, when group

[2] Conway, Paul et al. "Final Report of the ITAC Web Information Services 'Portal' Subcommittee." Duke University. June 9, 2003. http://www.oit.duke.edu/portals/documents/PortalFinalReport_v1.6.pdf
[3] Hagel, J. III, & Brown, J.S., "Your Next IT Strategy", HBR, Nov 2002, reprint

cooperation from stakeholders enabled large and expedient change.[4] Through solid coordination, projects encounter less resistance as it evolves to meet the changing goals.

3. Learn as you go.

Rather than continuing to study more than their seven schools to learn various portal implementations, Duke gave the green light to its portal pilot experiment. Each portal launch is different, and there is no case study or preparation that can adequately predict all the obstacles.

B. LESSONS LEARNED: MIT SLOAN'S SLOANSPACE STUDENT PORTAL (DOTLRN)

SloanSpace differs from traditional portals. First, it is not integrated with any backend connections. Another key difference is upon logon, all users see more or less the same page. However, despite the differences, there are still a few key lessons that can be learned.

1. Give priority to user concerns to decrease resistance to change.

Although there was no existing legacy system, the implementation of a portal required faculty and students to adjust to new processes. In addition to soliciting continuous feedback, SloanSpace had one person devoted completely to responding to the users during the initial implementation. By considering the users, Sloan IT was able to increase buy-in and avoid some disastrous effects such as the ones we saw in cases such as First National City Bank.[5]

2. Opt for continuous upgrades over the "big bang" approach.

Sloan IT intentionally avoided a "big bang" approach with Sloanspace. Although the budget was somewhat adjustable, the fixed deadlines as well as the participative management style, the approach was more of a "guided evolution".[6] The scope of the project did necessitate a large

[4] Linder, Jane. "AIRNow: Arming the Public with Air Quality Data"
[5] First National City Bank (HBS)
[6] Gibson, C.F., "IT-enabled Business Change: An Approach to Understanding and Managing Risk", *MIS Quarterly Executive* Vol.2 No.2, Sep 2003, pp 104-115.

process change, but the risks were not severe. Since the initial launch, Sloanspace has undergone one major version change, and two minor upgrades per year. These upgrades occur at off peak times for students, the summer and the winter (IAP, the interim period for MIT students). They found that this approach was fitting so as not to disrupt class times.

3. Be cautious of open source technology.

Some feel that the increasing usage of open source technology will cause packaged software to fall into obsolescence.[7] Although open source technology has largely been successful at Sloan, there were several problems. For example, the dependence of Open Source technology on "volunteer programmers" means that Sloanspace is unable to depend on these people consistently. As the .LRN community has continued to grow, MIT Sloan is optimistic that Sloanspace and other open source portals will be able to benefit from each other. However, this technology and community is not yet mature, and therefore not fully supported.

C. LESSONS LEARNED: UNIVERSITY OF CINCINNATI'S ONESTOP PORTAL (SAP)

Following the approach of Broadbent & Weill, three maxims have been gleaned from the University of Cincinnati case study.[8] As is the case with any maxims, these are not necessarily true for every IT project. However, as the portal project at the University of Cincinnati involves the same platform (SAP) and setting (academic) as the MIT portal project, it is likely the maxims will continue to hold. The maxims are explained below:

1. Add value to the community up front to create buy-in

Given the option of implementing features in any order, they should be added in order of greatest to least value. At the University of Cincinnati, this maxim meant serving the needs of users

[7] Discussion with Arup Gupta, Tata Consultancy Services
[8] Broadbent, M. & Weill, P., "Management by Maxim: How Business and IT Managers can Create Infrastructures," Sloan Management Review, Spring 1997, pp 77–92

itching for a better solution before addressing concerns that had not immediately manifested themselves. In the case of Lifeline, the employees were tolerant of the difficulties that arose from replacing the CORMIS system because they understood the changes would enable them to better serve customers and add value to the company.[9]

2. Projects with minimal cultural change increase buy-in

People do not like to change their routines unless they can foresee a significant benefit. Thus, projects should be designed to require as little change in the behavior of users as possible. At the University of Cincinnati, the upgrading the human resources system was saved for the second phase of the project, as it was believed that the upgrade would require a substantial cultural change. Upgrades requiring minimal cultural change were scheduled before the HR system so that there would be a base of users advocating the new system by the time the HR system was upgraded. In the case of First National City Bank, the cultural changes required of the machine operators were huge.[10] As a result, they resisted the changes, causing the bank's check processing system to grind to a halt. If First National City Bank had initially focused on minimizing cultural change for the people in the processing department, there would have been less resistance.

3. When budgeting, consider the costs of both implementation and training

When calculating the total cost of ownership of an academic portal, it is essential to consider the implications that adding features will have on increasing the cost of training. At the University of Cincinnati, the scope of the portal has been reduced in order to reduce the cost of training the portal's future users. In the case of the World Bank, there has been extensive usage of hands-on, on-location training to ensure that the users of its network all are able to fully exploit all of the

[9] Discussion with Rich Reich, CIO, Lifeline
[10] Gibson, C., "First National City Bank" (A)-(B-1) (HBS)

features that have been developed.[11] If money had not been allocated for training, the network's capabilities might not have been fully used after they had been constructed.

D. LESSONS LEARNED: NORTH CAROLINA STATE UNIVERSITY'S MY PAC ADMINISTRATIVE PORTAL (PEOPLESOFT)

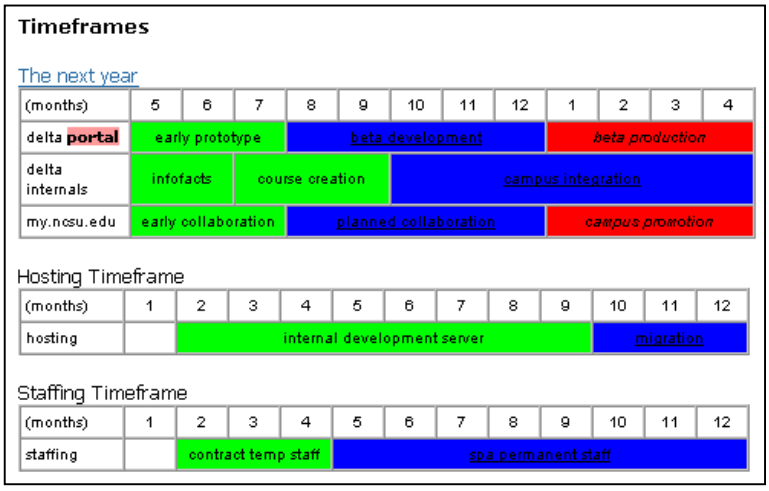
1. Fully investigate existing technologies before purchasing anew.

Instead of purchasing new software services to create portal features, NCState found that PeopleSoft offers more web services than realized. By identifying all services offered and to be launched, NCState successfully incorporated PeopleSoft's financial functionality into the portal.

2. Faculty portals must link to student portals for teachers to share the student experience.

When students approached their teachers with questions about the portal, the faculty wanted to answer the question intelligently – and share in the student's perspective.

Exhibit 6: North Carolina State University project timeline



3. Break projects into smaller goals for each stakeholder.

Unlike the project management timelines learned in class, the North Caroline State University created a manageable timeline for each individual stakeholder **(Exhibit 6).** People

[11] Discussion with Omar Baig, International Finance Corporation, World Bank

work better to timelines that are best suited to their unique skills. In addition, breaking down the responsibilities through the timeline tool allows for specific stakeholder accountability.

VII. Team Lessons Learned

Students rarely get the opportunity to do class work that affects MIT. Our team appreciated this valuable learning opportunity to interact with IS&T's Administrative Computing professionals and add value to current projects.

The general lessons we learned will be valuable for our internships and real world jobs. Therefore, we highly recommend that 15.568 partner with IS&T again in the future.

In addition to improving our teamwork, business writing, communication, and presentation skills, the MIT Portal project was a challenging and unique experience. While conducting our project, we experienced the guidelines of Randolph & Posner firsthand.[12] Overall, the project taught us about three aspects of the importance of careful planning:

- **Generous Timeline**: Before we began the external interviews, we knew that making contact would be difficult. Depending on people and interviews for outside research can be quite time consuming. Therefore, we created a timeline with a few extra days for each phase of the project. Not only did this mitigate the difficulty of the data gathering, it also kept us from having to work at the last minute. As a result, we were able to complete the project on time with relatively little stress.
- **Continuous Deadlines**: In addition to the biweekly status reports, our team set continuous deadlines for the creation of the interview template, meetings with the project champion, and completion of the external interviews. As was the case with PharmaCo,

[12] Randolph, W. Allen and Barry Posner (1988): What Every Manager Needs to Know about Project Management, MIT Sloan Management Review, p. 66

regular deadlines helped us accomplish tasks incrementally and allowed us to evaluate our progress often.[13] The constant assessment helped keep our project in scope.

- **Task Ownership**: All tasks were divided evenly amongst the group members according to personal strengths. For example, Tiffany was appointed the external contact, Adam wrote the MIT case, and Susie created the presentation. Status reports were divided evenly. This promoted group synergy.

This preparation proved to be crucial. When a member of our group dropped the class, we learned both the value of our planning, and how to properly respond to an obstacle. By that time, we were too far along in our project to rescope, and instead had to look for other ways to manage the unforeseen uncertainty this added to our project.[14] In addition, we still wanted to prepare quality research for our project champion. Therefore, we adjusted our project plan and all took on more work than originally planned. Fortunately however, we were still able to deliver.

Next, this project taught us to work more independently and to use our own judgment when necessary. Generally, MIT students depend on textbooks and formulas to complete assignments. At the same time, we learned to effectively leverage our available resources. For example, we had continuous contact with Professor Gibson and Evan. Both gave us feedback, and Evan was even able to set up the SloanSpace interview for us.

[13] Discussion with Ben Porter
[14] De Meyer, A. et al (2002): Managing Project Uncertainty – From Variation to Chaos, MIT Sloan Management Review, p. 63

VII. Post-Presentation Discussion Topics for Further Investigation

After a twenty-minute PowerPoint presentation, attendees MIT IS&T Vice President Jerold Grochow, Project Champion Wayne Turner, Kevin Lyons, sponsor Steve Winig, Professor Gibson, TA Evan Mamas, and the 15.568 class students asked follow-up questions.

The following questions are most relevant, and focus on the questionable value of the portal with its ability to fully integrate with administrative and student systems.

Customization Value Student Janice Lin observed how sites like Yahoo!'s 'My Yahoo!' portal is seldom preferred by users because of the lack of value in customization.

Insights: In a status meeting with Wayne Turner, we mentioned the same Yahoo! analogy. While the scope of our project was to do market research for the administrative portal and not decide whether or not the portal should be implemented, there is intangible community value in customization that is only apparent when the products exist. As in the EMC class case study, sometimes it is essential to make changes to an IT system to enable it to function smoothly in the future, even if the features seem of little importance today. The new portal will enable new methods of content presentation, and help the portal move in the right direction in the long term.

Student Portal Student Janice Lin observed that the Administrative Portal should share resources with other MIT gateways, including Sloan, Stellar, and Admissions. Lin also suggested how the student portal could potentially be released first for maximum visibility.

Insights: While MIT IS&T does not currently align its resources with student portals, which are often uniquely funded, technology consortiums to share best practices would be the most valuable short-term action. This report alone bridges the contacts of various schools. While

Janice is right, centralizing will be difficult in the short-term due to the decentralized structure of MIT. A centralization initiative, like the one that occurred at Tyco, would have to happen before a unified portal could be created.

Administrative Portal Value Vice President Jerold Grochow questioned the value of replacing the administrative gateways that exist today with the merely customizable portal.

Insights: In addition to standardizing the look-and-field of the websites that are being combined to create the portal, the portal project will enable AD to begin with a cleaner slate as it redesigns the presentation of its applications. The new portal will address political as well as technological issues. Administrative Computing set a precedent with the previous portal, of allowing stakeholders to demand that their applications be featured prominently on the portal. Unfortunately, this made the portal no longer comply with its original design philosophy. The new portal is designed to resolve that political issue by allowing the users to determine the content they see on the portal.

Stellar website TA Evan Mamas thoughtfully emailed documents containing the recent SloanSpace and Stellar case studies. We will share the documents with the MIT IS&T team.

VIII. Appendix

Appendix A: Contact Information

The following people have been contacted regarding the MIT Portal Team Project. For privacy, only the email addresses of the relevant persons have been listed.

15.568 MIT Practical Information Technology Management Instructors

Professor Cyrus Gibson, Sloan School of Management Senior Lecturer

Teaching Assistant Evan Mamas, Masters in System Design & Management

15.568 MIT Portal Team

Tiffany Kosolcharoen, B.S. Management Science '06

Susie Lee, B.S. Management Science '05

Adam Powell, B.S. Management Science, Writing & Humanistic Studies '06

Armando Valdes, B.S. in Electrical Engineering Computer Science '05

MIT Information Systems & Technology (IS&T)

Project Champion

Wayne Turner, Director of the Administrative Computing Department

MIT Portal Team Sponsors

Steve Landry, Web Services Coordinator for IS&T

Kevin Lyons, IS&T Tech / QA / Web Services / Group Lea

Executive Sponsorship

Jerrold (Jerry) Grochow, Vice President for IS&T

University Portal Case Study Contacts

MIT SloanSpace

Deidre Kane, MIT Sloan School of Management

North Carolina State University

Gwen Hazlehurst, Director of Enterprise Information Systems

Duke University
Deborah Johnson, Assistant Vice Provost, Director of Student Admin. Services

University of Cincinnati
Jim Lewis, Associate Director, UC Systems & Operations

Baylor University (Busy undergoing SAP Upgrade)
Bill Bevil, CSE, Sr. Project Manager, Baylor College of Medicine

Appendix B: External Interview Template

Created by the MIT Portal Team, the following template was used to gather consistent sets of information upon interviewing universities. Wayne Turner, the MIT IS&T project champion, approved the template.

15.568 Practical Information Management
MIT Portal Team

External Interview Template

University Name: _____

Date: _____

MIT Portal Team Interviewer Names: _____

External University Contact Information: _____

_____

Prior to Interview

The following should be completed if available online:

Research schools and available online portals / website

Write-up background information and history of portal launch

Research university contact and their IT role

Research portal technology (SAP, uPortal, etc.) of the university

_____

During the Interview

We will schedule a half-hour to an hour of time depending on the availability of the interviewee.

Introduction

Thank him/her for their time for a ____ minute interview.

Explain MIT's definition of a portal:
From the September 10, 2004 Migration Requirements Document:
To provide customized one-stop-shopping for all administrative and self service applications and

services. The primary audience for the Administrative Portal is MIT employees, but some applications, such as Student Group Reports, are specifically for students, and others, such as Training, are used by both employees and students.

Transactions include: Benefits, Directory Information, Training resources; transactions for administrators of a DLC who work with their organization's data - includes Financial, Master Data, and many other transactions.

Definition of a Portal: A hub or gateway to locate commonly used content. A portal gives approved users access to web-based information, tools, and services from one location, with single sign-on[15] and user-specific views. Roles-based profiles allow for dynamic, customized, personalized data. Use of portals allows for broadcast of messages or notifications, or narrower, targeted messages. Value of portals: single branding; link integrity; and due to customization of content, efficiency (time saving), reduced frustration, easier access to commonly used tools and information, and a more pleasurable experience.

Motivating Factors
> What were your driving factors to this portal implementation?
> Who were the key people who helped drive the portal creation?
> What is your definition of the portal?

Resources
> Budgeting
  - Exact costs (if possible)
> Human Organization / Resources
  - Training
  - Access to Organization Chart

Technology Selection
> What made you decide upon (uPortal, SAP, etc.) technology?
> Time / human efforts made in technology selection

Portal Strategy
> What features did you include / will include in your portal?
  - Functionality
  - Customization
  - Employee / Student needs
> Student and/or administrative portal?
> Was cost a factor in creating your portal? What were the limitations, if any?

Portal Implementation
> Gantt chart / Timeline of people and resources involved (if possible)
> Steps taken in all aspects of change management
  - Budgeting
  - Organization

[15] Because MIT uses certificates, it is more appropriate to think in terms of single session rather than single sign-on.

- People
- Training

Response
> What has the reaction been to the portal?
- Students
- IT Administrators
- Faculty

> How did you measure the "success" of your portal?
> What were your learned successes and failures?

Portal Maintenance / Future Activities
> What are the actions needed to maintain your portal today?
> Any new projects / additional features that you are adding to the portal?

Follow-Up Contacts
> Advice on whom to follow-up with
> Advice on websites to read other resources

After the Interview

Thank you email to the interviewee

Follow-Up with next people to contact and interviewee to keep him / her informed

Appendix C: MIT Gateway Redesign Case Study

MIT Sloan School of Management

Tiffany Kosolcharoen, Susie Lee, Adam Powell, & Armando Valdes

Gateway Redesign at MIT's Administrative Computing Department: Integrating Heterogeneous Web Applications into a Uniform Portal

In August 2004, Steve Landry, a Web Services Coordinator from the Administrative Computing division of MIT's Information Services & Technology Department (IS&T), realized that he would soon face a problem. The two administrative gateways that his department had created, referred to as SAPweb and SAPwebss (SAPweb Self Service), had both overgrown their initial design. After numerous additions had been made to both gateways, they were no longer easy to use. In order to research how other universities have handled similar situations, Professor Cyrus Gibson was contacted, and it was requested that a team of students in his class prepare a comparison of MIT's gateway redesign plans with portal design plans of other similar institutions. This case is the result of that request.

Department Background

In 2005, the Administrative Computing (AD) was a group within IS&T that exclusively handled IT issues related to administrative functions, such as payroll, benefits management, and employee data management. AD had a dedicated staff of managers and developers that worked towards fulfilling MIT's needs. When an IT solution was requested, the request was prioritized. Then, the staff implemented the solutions in an order dictated both by the priority of the solutions and the availability of human resources.

About Portals

Portal web sites, like the administrative gateway proposed by AD, had been around for several years. Within MIT, notable preexisting portals included SloanSpace, the portal for the Sloan School of Management; Stellar, a campus-wide course management portal; MyMIT, the admissions portal; and Infinite Connection, the Alumni Association Portal. Outside of MIT, many major institutions also had portals. Table A contains a list of institutional portals.

Table A: Institutions and their Corresponding Portals

Institution	Portal
Duke University	ACES
UC San Diego	Blink
California Polytechnic	MyCalPoly
Central Michigan University	My cmich
Des Moines	MyDMU
Harvard	MyHarvard
Indiana State	MyISU
UCLA	MyUCLA
University of Washington	MyUW
University of Cincinnati	OneStop
North Carolina State University	PackTracks
MIT Sloan School of Management	SloanSpace
University of Delaware	UD&me
University of Texas	UT Direct

North Carolina State University defined the word portal as:
"A hub or gateway to locate commonly used content. A portal gives approved users access to web-based information, tools, and services from one location, with single sign-on[16] and user-specific views. Roles-based profiles allow for dynamic, customized, personalized data. Use of portals allows for broadcast of messages or notifications, or narrower, targeted messages."

Portals can be custom programmed, or can be produced using packaged or open source software. Choice of portal development software is often determined by a combination of needs and the departmental budget. In the case of the development of MIT's new administrative gateway, referred to as "insideMIT", there was a great amount of flexibility in choosing a platform, as MIT already owned the licenses necessary to use SAP. Thus, primary technical factors drove whether the gateway was to be built with SAP or an alternative technology.

Division Operations

The overall strategy of AD was to build software requested by departments within MIT using internal staff. As AD had a fixed amount of Full Time Equivalents (FTEs), its ability to complete projects was primarily constrained by its manpower. Projects were pitched to AD, and then were assigned a priority for completion. During the planning phase that occurred during 2004 and 2005, the gateway project had less than one FTE allocated to it. Thus, a larger team would have to be constructed during the implementation phase. As development resources were limited, projects were designed so that their outcomes would hopefully last for at least five years.

Maintaining systems on this time horizon, it was hoped by AD, would help simplify the lives of users, as the users incurred a time cost to learn the system every time the system was changed. When AD built websites and gateways, it was seen as essential that they had the MIT "look and feel", and were able to operate well in the MIT environment. Thus, packaged software products without customizable user interfaces were less desirable. The MIT environment consisted of a

[16] Because MIT uses certificates, it is more appropriate to think in terms of single session rather than single sign-on.

relatively heterogeneous set of computers and browsers. It was expected that a significant number of users would be using Microsoft Internet Explorer, Mozilla Firefox, and Apple Safari, as well as an assortment of other browsers. Therefore, it was essential that the gateway solution comply with W3C standards.

Likewise, it was essential that the interface of the gateway be internally consistent. The administrative services gateway that was currently in place, SAPweb, was originally organized around tabs that were functional groupings, such as "Purchasing", and "Accounting". Due to departmental demands, there had subsequently been the addition of tabs with departmental, rather than functional titles. (See Appendix Exhibits 1 & 2) In the redesign process, it was essential that all of the components of the new gateway maintain a consistent look and feel, both graphically and functionally. (See Appendix Exhibit 5)

Gateway Redesign Project

As MIT's SAPweb administrative process gateway and SAPwebss employee information gateway grew beyond their original scope, AD began planning to replace the gateways during the summer of 2004. The goal of the new gateway was to simplify the user experience by only providing the user with features pertinent to their position. Users of the new gateway, insideMIT, were categorized into three categories: faculty and students, accounting officers, and general users. Using certificates, insideMIT would be able to automatically recognize the category that a user was in, and then show them the appropriate features. Additionally, users would be able to customize the features they are shown in subsequent logins, so that the gateway would best suit their needs. In order to achieve this, the old static HTML gateway would be replaced with a new gateway built on portal technology.

The goals of the gateway project, as synthesized by Nancy Gift in the Administrative Intranet Migration Software Requirements Document were to:

- Enhance employee productivity by providing "one-stop shopping."
- Generate greater awareness of new functionality.
- Stay competitive with other Universities who have been using portal technology for several years.
- Provide technical capabilities that enable end user customization and personalization.
- Enhance job satisfaction.
- Coordinate UI design with other MIT enterprise Web sites, promoting the MIT brand.
- Demonstrate acknowledgement and implementation of user feedback.
- Achieve product stability. A life span of five years has been anticipated, but this might be extended by changing only the underlying technology. Product stability reduces user disorientation, reinforces brand recognition, and builds confidence.

Administrative Computing was taking a total redesign approach towards the insideMIT gateway. As development resources were limited, it was essential for AD to begin the gateway project with a clear assessment of the time necessary for development, the cost of development, the cost of maintenance, and probable difficulties to be encountered during gateway construction. During the summer of 2004, Nancy Gift, a web developer at AD, was assigned to spend half of her time

devising a plan for the gateway. Gift prepared several documents about the gateway in order to create a functional definition. It was decided that a multi-phased development approach should be taken. Some features would be included in the first phase, while other will not. The following lists have been extracted from Gift's document.

Functionality Included in insideMIT:

1. My Home Page (Personal, customizable page)
   a. Optional trays might include: Calculator, News, Google, Yellow Pages, etc.
   b. User selected Administration trays.
   c. User selected Self Service trays.
   d. My Bookmarks
2. Administration
   a. Financial transactions: All Requisition transactions, Credit Card verification, Journal Vouchers, etc.
   b. Administrative transactions: Update Personal Information, Facilities Repairs, Environment, Health, & Safety look-ups, Student Group Reports, etc.
   c. Administration Bookmarks
   d. User selected additional trays, if desired.
3. Self Service
   a. Employee Benefits Information
   b. My Information
   c. Training & Development
   d. Campus Life
   e. Money Matters (planned future functionality)
   f. Self Service bookmarks
   g. User selected additional trays, if desired.
4. Support
   a. Notifications
   b. Roles
   c. Manuals
   d. Contacts for assistance
   e. Support bookmarks

Features in Phase One:

- Trays with the following capability options: collapse/expand; edit; delete.
- Trays that can be rearranged within and between columns, drag-and-drop if possible.
- Ability to select colors & themes (from a finite selection).
- Ability to resize text.
- Ability to add/delete content by selecting/deleting additional trays.
- Multiple ways to select trays.
- Ability to add/delete additional tabs (pages).
- Ability to create multiple sets of bookmarks with custom names.
- Ability to arrange bookmarks in user order rather than by alpha only.
- Ability to delete a column.

Features Not in Phase One

- Ability to resize column. (Perceived technical difficulty.)
- Ability to add a fourth column. (Would cause horizontal scrolling resulting in poor usability.)
- Choose a different skin (color & theme) for each tab. (Perceived technical difficulty.)
- Ability to detach trays as separate windows, such as a calculator. (Can be evaluated later for value added and ease of implementation.)

Technical Issues

There were several technical issues associated with the gateway project. The gateway would involve two technologies that were unfamiliar to the Administrative Computing development team; Web Application Server (WAS), and Java 2 Enterprise Edition (J2EE). The rollout for these systems, and the associated "skilling", would correspond to the schedule designated for new payroll applications, which would also use WAS. This meant that the rollout of insideMIT could occur no later than January 2006. Luckily, human resource allocations would not need to be changed to implement the project, as there had already been a redesign of the SAPwebss system scheduled, which this project would supersede. It was believed that the team of developers currently assigned to the redesign of the SAPwebss system was adequate for implementing insideMIT.

WAS potentially would be implemented using a version of SAP R/3 that was older than the version recommended by SAP. Under normal circumstances, the portal module of SAP could be used without any additional hardware or licensing. Due to the usage of an older version of SAP, it had to be verified that this was still the case.

Additionally, all of the groundwork done for insideMIT had been conducted by a web development team within Administrative Computing, as well as a group of undergraduates within the Sloan School of Management. As a result, in the future, it would be necessary to have someone with project management experience define analyst and project management roles for insideMIT before its implementation.

Exhibits

Exhibit 1: 2005 SAPweb Design

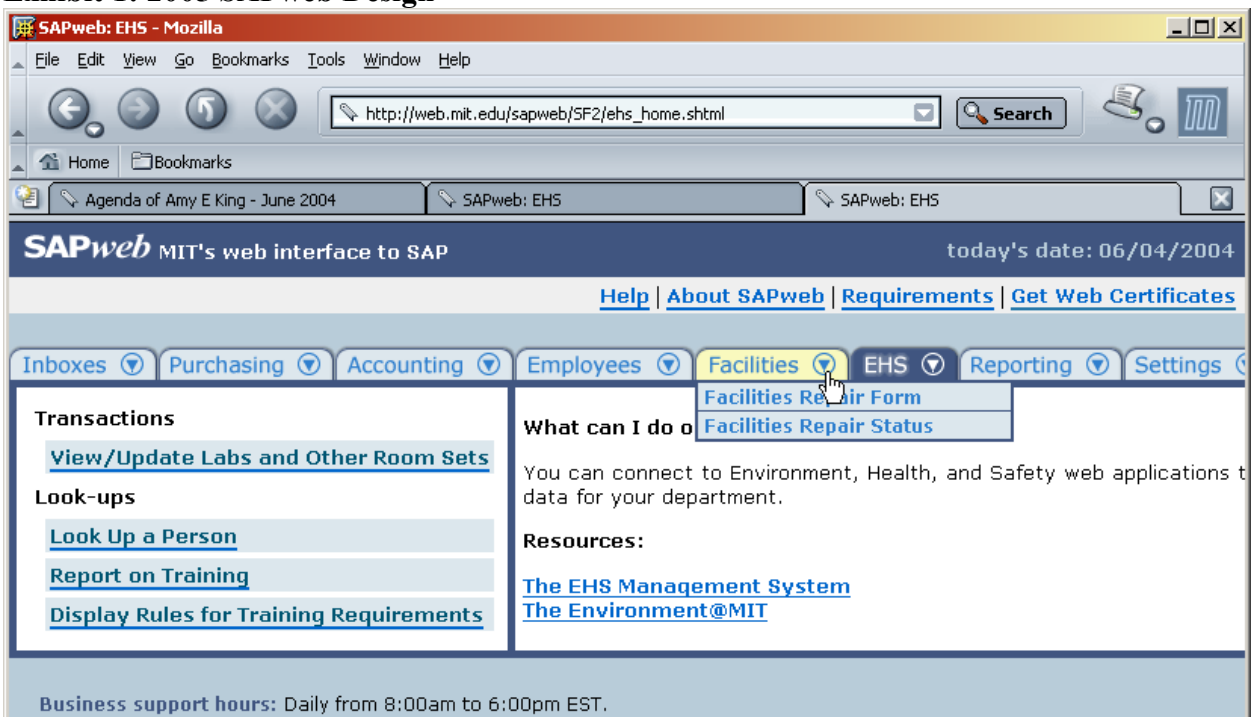


Exhibit 2: 2005 SAPwebss (Self Service) Design

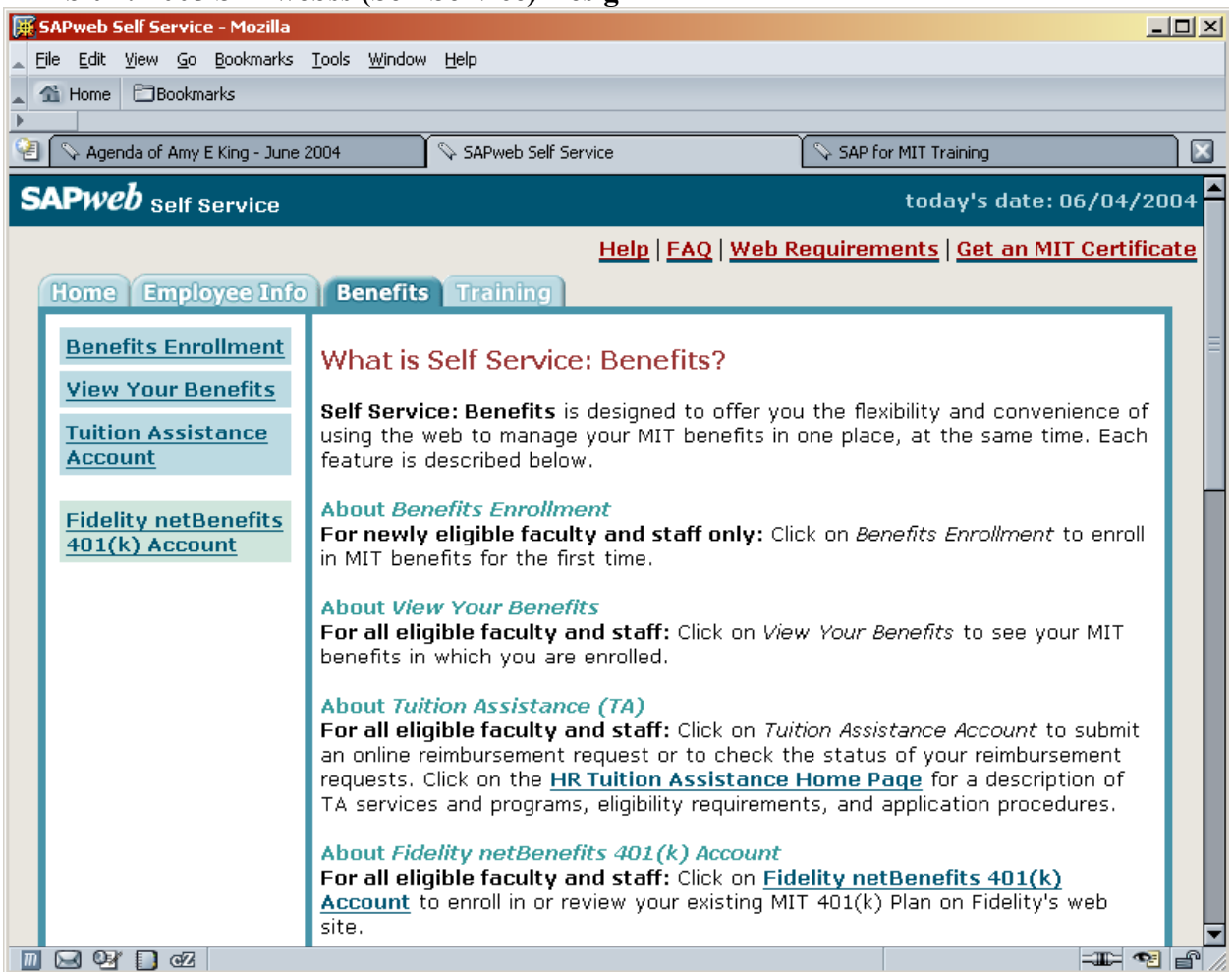


Exhibit 3: Open and Restricted Content on the insideMIT Portal

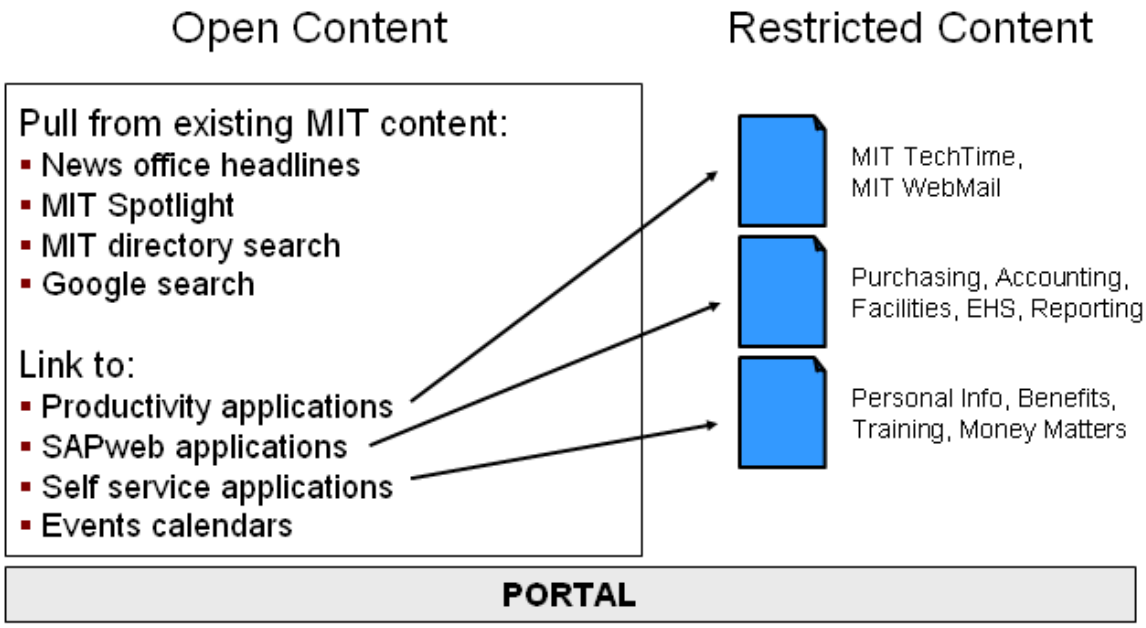


Exhibit 6E: Mockup of insideMIT Portal

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Appendix D: Duke University's DukePass Case Study

MIT Sloan School of Management

Tiffany Kosolcharoen, Susie Lee, Adam Powell, & Armando Valdes

Interview Background

Deborah Johnson, Duke University's Assistant Vice Provost and Director of Student Administrative Services, was interviewed by the MIT Portal Team. Duke successfully implemented DukePass, a student portal from the U-Portal open-source software. The budget was time and effort, for the systems and software were open-source and free. The costs of the project involved shifting man-hours from other projects to DukePass. While no administrative portal exists, current plans are to create and integrate portals from graduate schools.

The case study includes insights from the interview and correspondence, from Ginny Cake and Deborah Johnson's "Moving to a Production System" document, and the Committee's Final Report.

Background

On September 4, 2002, the Duke Office of Information Technology held an exploration meeting on web portals (http://www.oit.duke.edu/oit/explorations/). Constituents from nearly all of the major departments at Duke met to discuss what is being done with portals, both inside Duke and at peer universities, as well as the risks, opportunities, and needs of a Duke portal effort.

The group agreed that the time was right for Duke to move forward with an investigation of an enterprise portal system, focusing on a pilot implementation to gain quick experience, rather than establishing a group that would attempt to "solve" all of the issues surrounding portals without having institutional experience in this area.

Portal Strategy

As a result of this meeting, Information Technology Advisory Committee (ITAC) chartered the Web Information Services Subcommittee to develop the ideas that came out of that exploration meeting. The subcommittee was charged with nine specific goals, including the development of a better "portal" definition and the definition of a pilot project. The subcommittee was asked not to develop specific functional or technical requirements for an enterprise portal, or to evaluate specific portal software products. The subcommittee's full charter is available on the web at http://www.oit.duke.edu/portals/ .

After interviewing seven institutions, Duke focused on gaining the experience rather than theoretically solving portal issues. The project champion, Deborah Johnson, coordinated three teams of stakeholders: student content, service provider, and design & technical. The pilot was implemented in two stages: Phase I – a pilot undergraduate student portal was successfully launched in fourth months from conception; Phase II - the undergraduate portal release, whose success is now the driving force for the graduate, faculty, and administrative portals of the future.

Goals for Portal Environment

- To serve as the gateway to electronic services and the foundation of each individual's (students, faculty and staff) electronic relationship with Duke University.
- To provide convenient, single sign-on web access to a majority of the essential and relevant tasks and services needed by members of the Duke community.
- To provide individuals with the tools and information they need in an efficient manner while allowing them to personalize and customize the portal to meet their individual preferences.
- To provide a centralized and coordinated means of communication – to individuals, groups of individuals or the entire Duke community – as an alternative to email.
- To complement the web sites maintained by the graduate and professional schools as well as sites maintained by the various departments and divisions across the Duke community.
- To contribute to a sense of community at Duke University.
- To provide leadership and standards for web-based programming at Duke University.

Division Background

The Information Technology Advisory Committee (ITAC) chartered the Web Information Services Subcommittee with nine specific goals: better "portal" definition and the definition of a pilot project. The subcommittee was asked not to develop specific functional or technical requirements for an enterprise portal, or to evaluate specific portal software products.

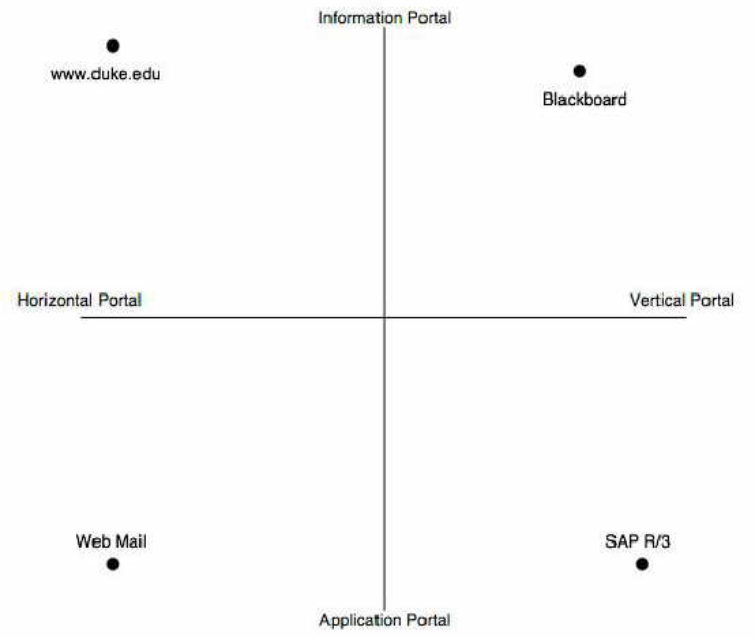
Duke's Portal Definition

Duke's ITAC Web Information Services Subcommittee Final Report cites a Gartner Group 2000 research report, describing 'portal' as "one of the most abused terms in all IT. "

At a very high level, a portal is an organizing principle – a vision of integrated applications and information sources available to members of the Duke University community. A portal is a framework that unites the institution's multiple systems under a coordinated security mechanism, providing an intuitive and customizable online experience. A portal is action or activity-oriented, not simply an aggregation of information from multiple sources or a topical gateway. At a deeper level, the information technology industry is converging on a portal taxonomy that is worth understanding.

According to Howard Strauss, portals tend to be categorized on two axes (see Figure 1 below): · Audience: Who does the portal serve? "Horizontal" portals tend to serve very broad groups of users. "Vertical" portals are more focused, serving users interested in a particular topic or set of applications.· Content: What information and services are available from the portal? "Information" portals bring together static documents from multiple sources, both inside and outside an organization. "Application" portals focus more on providing access to applications within an organization.

Duke: Figure 1: Portal Classification Axes with Examples from Duke Sites



In Duke's university portal research, three technical themes are common to all implementations:

Authentication and Authorization:

The portal must provide a roles-based, single sign-on for all services it offers, as well as a reasonable method for re-authentication when accessing sensitive services.

Customization:

Customization should occur automatically – based on a user's role within the organization and their current context within the portal – as well as individually, according to various preferences the user has set.

The portal must allow the user to modify the "view" to include information sources and applications of interest. Certain information may be deemed "critical" and permanently displayed, but ultimately the decision on what content appears, for the most part, should be left to the user.

Beyond this, portals must also offer customization at the application or information source level. If a portal provides an email application, for example, the user should be able to specify which email system they use and perhaps how often the portal system should check for new messages.

Integration:

A portal is only as useful as the content it provides. A portal framework must provide standards-based mechanisms for including both information and application content sources. XML web services protocols have emerged as an important standard in this space.

Duke's Benchmarking Initiatives

As a member of the Common Solutions Group (CSG), Duke solicited eight CSG institutions with portal initiatives to share their experiences on a set of parameters.

Duke interviewed seven, one of whom had two separate portal initiatives. Of the eight portal initiatives considered, four classified their initiatives as successful and four as stagnant or unsuccessful. Appendix 4 shows the raw responses from each of the eight universities surveyed.

In general, the portals classified as successful experienced a great amount of use by a large percentage of the target university community and are populated by a significant and growing number of applications.

Conversely, the portals classified as stagnant or unsuccessful have had costs that proved unsustainable, and/or a discontinuation of development efforts.

Among all eight initiatives, there were common points of both success and failure. Common Factors Vision: All those interviewed noted the importance of a clearly articulated vision. This is true both of the schools with successful portals and those whose initiatives had stalled or failed.

Components of a clearly articulated vision include:

- A vision of the web as a means to deliver services
- A portal as an organizing principle supporting the vision
- A mandate-endorsement and visible support from the University's highest executive level
- Strong and clear project leadership
- Active and on-going efforts to involve stakeholders in the development process

Critical Success Factors

- Include undergraduate students as in initial target user groups
- Significant attention to ongoing and two-way communication with stakeholders that informed project leadership.
- Stakeholders include members of the user communities and the application developers.

Choice of portal tools

The choice of software development tools is fundamental. Regardless of the specific tool set used, the following characteristics were highlighted as critical to success by both those with successful and those with unsuccessful initiatives.

· Modularity

· Threaded, scalable architecture

· Distributed development efforts, including central deployment of authentication services, overall portal framework, and template design with distributed deployment of sub-portals, constituent-specific/department-specific applications, and maintenance of authorization lists.

Focused and sustained effort:

A portal is not a one-time project. It is an agreement across the University that all will benefit – the user communities as well as the application owners – through cooperation; and a resulting framework within which both technical and social cooperation can be orchestrated.

A successful portal grows over time. It is designed (socially, technically and aesthetically) to strengthen communication within and across user communities and to support the development and integration of new web services.

Operational Costs

Duke successfully launched its portal with only basic fixed costs. By selecting the uPortal open-source technology, Duke avoided the software licensing fees needed by other portal companies. Duke observed that employees would need to be trained on the new portal and volunteer student groups would need to be coordinated regardless of the technology chosen.

Technology Selection

uPortal open-source software was selected for the student portal. Since no data needed to be transferred, no integration costs existed. Duke University currently licenses SAP systems.

Definitions of Web Services

The major players developing web services technology infrastructures include BEA, IBM, Oracle, and Sun Microsystems. Microsoft is also working in the web services arena (in association with its.NET domain) but with a distinctly different and non-standardized approach. Other companies are developing particular facets of web services infrastructure, including ATG, Bowstreet, Novell, Plumtree, SAP, Sybase, and Vignette. An application portal developed through web services is different from one built with enterprise application integration (EAI) tools that the software industry has marketed as "portals" for over a decade. Some applications of web services are related to the broad category of EAI.

The differences are three-fold. First, EAI solutions link existing, monolithic applications into a common infrastructure, while web services are designed to allow for smaller, modular functionality that can be assembled and reassembled into dynamic processes. Second, most EAI technologies are designed to form discrete, pre-specified connections. Finally, EAI solutions' "all or nothing" modules require a significant commitment of strategy and resources, while web services can be deployed with incremental cost and effort.

Buy or Build: Technology Customization

In 15.568 Practical Information Technology Management, Tata Consultancy Services President Arup Gupta questioned students on the future of technology's packaged solutions versus custom implementation. Duke University faced similar challenges in selecting the portal technology.

In the absence of unified standards and in the presence of competition between multiple open-standards and proprietary approaches, an organization like Duke was forced to either buy a software tool from a single vendor-producer or build an application through in-house programming efforts.

The former approach ("buy") held Duke captive to a company that may provide no migration path for services and content. The latter approach ("build") posed significant long-term challenges related to expertise retention, scalability, standards compliance, and interoperability. An alternative portal development path might leverage emerging web services standards and protocols for Duke's enterprise software applications. This hybrid approach provided an

"integration specification" which could be used as a measuring stick when making decisions associated with the purchase, integration, and/or upgrade of applications and web services.

While the marketplace of existing portal products may not fully implement emerging web services standards, it was crucial to consider these standards when defining a technology framework for portals at Duke.

Return on Investment

While it is difficult to determine a specific ROI in terms of real dollars, the establishment of an enterprise portal environment enables Duke to:

· Leverage enterprise systems investments by improving services delivered

· Centralize the infrastructure and environment for web services development, saving time and money for individual groups around campus that wish to deploy web services.

· Enhance the security and reliability of web services efforts by providing a robust, scalable development platform that leverages existing enterprise systems like the directory and authentication.

· Increase productivity of the Duke community by organizing web information and application sources in a way that is useful to the many constituent groups around Duke.

· Provide common channels for timely and directed communication to Duke's broad and varied community.

The potential cost savings of eliminating duplicate systems, resources and processes could be approximated, but it is impractical to put a price tag on the value of improved delivery of services, enhanced communication among constituent groups, and the strengthening of the public vision of the Duke community. It was extremely important to consider both the quantitative and qualitative benefits of an enterprise portal initiative when determining long-term funding.

Pilot Project

The Duke undergraduate students were targeted as the constituent group for the Duke portal pilot. Based on the analysis of services by constituents (see Appendix 1), Duke found that the balance of horizontal and vertical dimensions for this constituent group yields a very large overall value.

Best practices (at Fuqua as well as some of the benchmarked peer institutions) show that a **constituent-based approach** enables creation of a critical mass of value for the targeted users and correlates with the success of the portal. There is also noticeable demand for integrated access to information and services from the undergraduate student space.

Tangible ROI was later derived from (1) leveraging a common application framework in which software and information can be repurposed, and (2) new web services that provide improved operating efficiencies (e.g. an online timecard submission system for student staff).

Pilot Services

While the content team should be involved in determining the "critical mass" of content needed for the first iteration of the pilot, Duke considered the following services most important:

· Web-based e-mail

· Event and academic calendars

- Online student elections
- Student Life content
- Student account and course information
- Campus locator (with overlays for clusters, labs, and wireless)
- Student e-portfolio
- Student marketplace (textbooks, classified, computers)
- Access to library account information
- Duke Card deposits and transaction history

Current environment

On February 16, 2004, Duke launched a "pilot" undergraduate student portal utilizing uPortal, an open source software product that is developed and maintained by a broad consortium of universities. The pilot was limited in scope and functionality to allow quick deployment (within 3 months) and to create an environment that would allow Duke to gain an understanding of portal acceptability and its value to users. It also provided us an opportunity to identify services that could be delivered via a portal and the technical requirements necessary to support a portal environment at Duke that meets all user groups' needs (students, faculty and staff).

For the pilot, the following functionality was delivered utilizing uPortal as the foundation with integration to Blackboard, Peoplesoft and Duke WebMail:

Single sign-on to
ACES, discussion forum and webmail
Blackboard Course Announcements
Discussion forum (DevilTalk)
DukeCard food and FLEX balances
Newsfeeds (RSS feeds)
The Chronicle, GoDuke.com, ESPN, and *The NY Times*
Static links to information about student life, entertainment, technology, academics, and services (due to the time constraints for the pilot portal)
Announcements
Personal bookmarks
Sticky notes
Access to webmail

The launch was extremely successful. Based on comments and results of a recent survey, the overall theme was that students like having the one-time logon and seamless integration to Duke applications/online services at one convenient and secure location. For a summary of survey results, see appendix A.

Business drivers

A portal addresses the needs and expectations of students, faculty and staff on college campuses who live and/or work in a world where computers, email and the Internet are necessities for conducting their business. Additionally, the burgeoning amount of information available via the Internet has changed the question from "What information can I find?" to "How can I manage the information that is available to me?"

On a daily basis, students need to access enterprise applications such as email, Blackboard and ACES (PeopleSoft) in addition to numerous web sites that contain information useful to them,

whether it is within the Duke community and beyond. Likewise, enterprise applications such as SAP R/3, Pillar, Applicant Referral System, Blackboard, FPS and PeopleSoft are used by many faculty and staff across campus.

A portal at Duke will provide a means for delivering information and access to enterprise applications (with appropriate authorization) for students, faculty and staff that will enable them to be more efficient, productive and effective. The ability for each user to customize their view of the portal provides the flexibility to make the online experience personal and compelling for all members of the Duke community.

Business impact

A web portal that provides single sign-on access to enterprise systems at Duke and the convenience of 24/7 online services would reduce the amount of time spent by students, faculty and staff on completing processes that are integral to life at Duke (e.g., making account payments, printing enrollment certifications, adding funds to DukeCard, hiring personnel, developing budgets, processing financial transactions, providing course materials, submitting grades, obtaining parking permits). Portals make relevant information accessible to the person any time and any place.

An additional benefit for implementing portals at Duke is that during the planning and implementation of portal functionality and features, business processes will be reviewed to ensure that they are as efficient and effective as possible before they are "dropped into" the portal structure. Well-designed and maintained portals are also in a constant process of updating to ensure that the information and processes delivered via the portal are "fresh." Thus, portals can facilitate business process evolution and continuous improvement.

Integration with Student Services

In her interview, Deborah Johnson was also involved in the development of Duke's Student Services Center to provide a one-stop-shop for students. By being involved in both the DukePass portal and the Student Services Center, Johnson merged intangible technology services with the physical to provide a better end-to-end service for students.

Duke's Next Steps

1. Move to production environment: Implement a production portal with extended functionality that provides a basic "splash" page viewable by anyone and provides the capability for all Duke students to logon to the system to access their customized student view and personal resources such as email, Blackboard, DukeCard, personal messages, etc. The infrastructure for this system - both functional and technical - will allow for an iterative, organic approach for subsequent constituent efforts such as a faculty or staff view. A phase approached to portal development is recommended to ensure a successful rollout and that we address student needs and current processes effectively.

2. Promote DukePass to the incoming freshman class: Culture change is the most dynamic aspect of the future success of the portal. It will be important for the portal environment to be stable during the 2004 summer to promote DukePass to incoming freshmen who will have access to it upon receipt of their NetID and password in late May. It is hoped that incoming freshmen

will begin to log into DukePass prior to matriculation and, as a result, will view DukePass as an essential and helpful part of their daily life at Duke.

3. Functional Ownership: Assign a functional owner under the leadership of the Provost who will be responsible for working collaboratively across Duke to lead and promote the functional development and maintenance of the student portal. (See Appendix B – Functional Teams)

4. Technical Ownership: Assign a technical owner under the leadership of the CIO who will be responsible for working collaboratively within OIT and across Duke to lead and promote the technical development and maintenance of the overall portal environment and proposing how it fits to the overall architecture and other enterprise systems. (See Appendix C – Resource Requirements)

5. Create a "task team(s)" that is charged with researching and developing a business case and proposal for the implementation of a faculty and/or staff portal. It is important to understand the business drivers and functional requirements before determining the technology aspects.

Timeline – Go Live Dates

Fall 2004 Phase I – Undergraduate students
Spring 2005 Phase II – Graduate and professional students

Scope and Deliverables

Phases I and II encompassed the information and enterprise systems access relevant to undergraduate, graduate and professional students with the following additional functionality which was stated by students as essential.

1. Single sign-on to all university enterprise applications (add Blackboard during 6.1 upgrade)
2. Individualized administrative transactions (e.g., updating health insurance waiver information, viewing grades, registering for class, generating enrollment certifications)
3. Personalized, individual announcements from university departments
4. Ability for users to add own news feeds
5. Weather – graphical day image with optional five-day graphical display
6. Events calendar (minimal "events of the day", preferably a customizable interface)
7. Personal calendar (not feasible for 2004/05…needs enterprise infrastructure)
8. Search engines (example Google, Yahoo)
9. DukeCard - add funds to FLEX and dining
10. Order, view and pay for telephone and cable TV services
11. Library services (listing of materials checked out and due dates, reserve books, renew books, recall books, search library catalog)

Duke Appendix A: Summary of Survey Results

An email message with the URL of a web survey was sent to 1873 undergraduate students who had logged into, or attempted to log into, the DukePass portal during the pilot period. A total of 272 students completed the survey for a response rate of 14.5%.

Overall
Students were asked about their frequency of use for DukePass. Almost half of the students (44%) indicated that they logged into DukePass either several times per week, once per day, or several times per day. When asked about their level of satisfaction with DukePass, the majority (87%) indicated they were satisfied or extremely satisfied. Comments such as "It puts everything at my fingertips," "It has everything I need, the interface is good, and the one login for several functions is really useful when I'm planning on using different NetID-requiring pages," and "Everything I need is in one convenient spot - no searching and little frustration" indicate that the students appreciate the portal's ability to deliver the content and functionality they need as an undergraduate student at Duke in a convenient and efficient manner.

Ease of Use
Students were asked about the organization of the information on the portal with 92% of the students indicating that information they needed was either easy or very easy to find. The use of the tabs for organizing the content proved to be helpful with 94% of the students indicating that the tabs were useful or very useful for finding the desired information.

Content
The survey attempted to ascertain what functionality and features would be needed to compel students to use DukePass as their home page. While 25% of the students indicated they had already made DukePass their home page, the suggested changes by students included many of the functions and features that the Portal Content and Services Teams had recommended, but due to the short timeframe and technical complexities, were unable to be included in the pilot. One of the most frequent requests was for single sign-on to Blackboard, which will be available when Blackboard is upgraded to version 6.1 this summer.

Other suggestions for changes that would compel students to make DukePass their home page included providing the ability to add news feeds, enabling auto login to the portal (allowing the user to set up the computer to remember his/her NetID and password to DukePass), adding an events calendar, having a "default" public page that doesn't need a login, displaying DukeCard information, and adding search engines such as Google and Yahoo.

When asked to select the top five services or functions that they would like to have available via the portal, the responses indicated some consistency with suggestions previously listed for making DukePass their home page. The top five were:

1. Add funds to my FLEX account or POINTS (174 responses)
2. Seamless access to Blackboard (154 responses)
3. Online information about my DukeCard FLEX and dining balances (133 responses)
4. Events calendar (129 responses)

5. Buy tickets to Duke events (113 responses)

In addition to these five services, numerous others were mentioned, but would be of a lower priority to implement. A more detailed summary is available upon request.

Duke Appendix B: Student Portal – Functional Work Groups

It is anticipated that the following groups/teams will participate for the development of a fully functional portal for undergraduate, graduate, and professional students:

A. Undergraduate Student Advisory Group

- DSG
- Duke Union
- Duke Publishing Group
- Campus Council
- Engineering Student Government
- The Chronicle
- East Campus Council
- Representative from Graduate/Professional Group
- Two members from the Services Advisory Group

B. Graduate/Professional Student Advisory Group

- GPSC
- Graduate School
- Fuqua School of Business
- Law School
- Pratt School of Engineering
- Divinity School
- School of Nursing
- School of Medicine
- Nicholas School of the Environment
- Representative from Undergraduate Group
- Two members from the Services Advisory Group

Note: GPSC will be responsible for identifying a total of 8 graduate/professional students and attempt to have one individual from each of the schools listed. However, it is possible that a school may not have a student representative and another school may then have two representatives.

C. Services Advisory Team

- Student Affairs
- CIT
- Provost Office
- Library
- Trinity Dean
- Registrar
- Admissions
- Campus Services
- Alumni/Development
- Arts & Sciences
- Duke Stores
- Athletics
- Faculty
- News & Communications
- SISS
- Pratt Dean
- Bursar
- DukeCard
- International Office
- Pre-Major Advising
- Financial Aid/Student Loan
- OIT Help Desk
- Representative from Council on Graduate and Professional Student Affairs

Duke Appendix C: Resource Requirements

Technical Staffing

The creation of an enterprise student portal will require dedicated technical resources for planning, developing, and maintaining a production system. The following estimated resources are based on information learned during the pilot.

Pilot Phase Expenditures: $48,892

Anticipated Expenses: (Phase I & II)

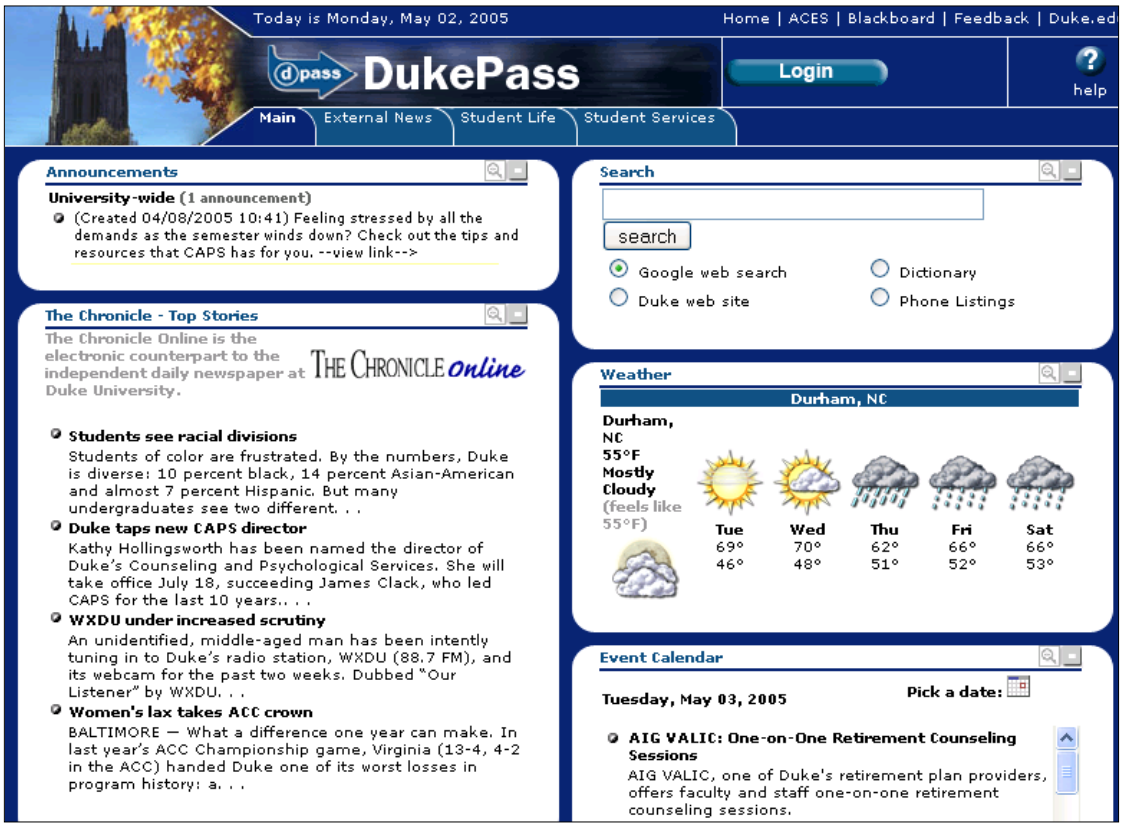
.75 FTE	Project Manager	75,000
1.5 FTE	Software Developer	150,000
.25	Database Administrator	28,814
.25	Systems Administrator	28,814
	Total Annual Development Cost	**281,628**

In addition, specific "channel" and integration development will quite often require contributions of effort from the technical owners of the particular enterprise service being integrated into the portal. The amount of effort necessary to deliver a particular channel will vary depending on the complexity of the channel itself and the flexibility of the enterprise service in terms of supporting external interfaces. These types of efforts will be coordinated with the functional and technical teams in those areas.

Hardware

Current hardware environment that supports the pilot environment includes 3 production and 2 development servers. Total expenditure for the pilot hardware was $29,331. The current configuration will be sufficient for implementing phase I and II of the student portal. We will need to set aside $10,000 annually in preparation for a 3-year replacement cycle.

Duke Appendix D: Duke University's DukePass http://dukepass.duke.edu



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Appendix E: MIT Sloan's SloanSpace Case Study

MIT Sloan School of Management

Tiffany Kosolcharoen, Susie Lee, Adam Powell, & Armando Valdes

In 2005, Dee Kane, Faculty Liason for Sloan IT, was preparing for the next upgrade of Sloanspace, the portal for students and faculty at MIT's Sloan School of Management. From its humble beginnings as a master's thesis by two computer science students to its current position as the pioneer of an open source community and the hub of classes at Sloan, Sloanspace had made great strides. Dee knew that Sloanspace had reached a relative maturity point, but she also realized that a great deal of work still had to be done.

Background

MIT's Sloan School of Management is one of the world's leading business schools. In addition to highly respected faculty and courses, Sloan is also known for its advanced research and technology. Its affiliation with MIT gives it a history of innovation and student responsiveness.

Therefore, it is no surprise that the original idea for Sloanspace came from the students. They wanted a single site to aggregate their coursework and communicate with professors, TA's, and other students. At a time when portal technology was just being conceived, MIT was on the cutting edge.

A simple prototype from 1998 to 1999 had met with success, and Sloan's IT department was ready to develop a full scale installation. There were two main options for the development at that time: a commercial package or customized in house programming. There were three main reasons why Sloan IT chose not to go with a typical commercial package.

1. **Functionality**: Many of the available portal packages did not offer the capacity to create communities. This was one of the original intentions of Sloanspace. Therefore, the user requirements dictated the use of a different technology.
2. **Upgrade Capability**: Not only did vendors not currently offer certain desired services, it was also doubtful that such a vendor could offer upgrades and enhancements as desired. Given the importance of the Sloan portal, the IT department wanted a technology that could be easily updated.
3. **Partnerships**: Early in the venture, an MIT professor offered the services of his startup company, ARSDigita. This partnership enabled Sloan IT to create a portal at minimal cost, and ARSDigita to increase their own credibility and experience.

Therefore, Sloanspace was originally designed using the ArsDigita Community Education System (ACES) as a compromise of sorts. It was not a widely used software, but it was a toolkit from a vendor. At the same time, it still required a significant amount of design. ACES was built using the ArsDigita Community System Toolkit, (ACS). At the time, both ACS and ACES

ran on Oracle only. Therefore, in addition to the ArsDigita programmers and Dee, Sloan IT hired 2 full time programmers for the project team.

From spring to fall of 2000, the first release required three months of consistent effort. During this time, Sloanspace went from scripts to QA testing. Finally, ACES was rolled out in Fall 2000. This first version of Sloanspace included the community and file sharing capabilities.

Users were receptive to the course management system. However, Dee attributed one key factor to the easy transition: Sloan IT had one person working fulltime just to address user concerns. Because the IT department was so open to feedback, resistance to Sloanspace was minimal.

Towards Open Source

ArsDigita closed its doors in early 2001. At that time, the community around ACES decided to make the Toolkit fully open source, so that it would run on Postgres, and renamed the open source project to OpenACS. There were many reasons to do so. Specifically, according to Sloan CIO Alfred Essa, "Open source provides not only the source code, but visibility into the development process and path,"[17] a top priority for MIT.

By the summer of 2002, ACES was renamed to .LRN, which became a project of OpenACS. Version 2 of Sloanspace, launched in Fall 2004, was based entirely on this platform.

> *"Our instantiation of .LRN is called SloanSpace and we were the first adopter and the catalyst for a lot of the early development of the platform. After we ported our system to this newly named .LRN, we contributed the code back to the community, so that other institutions and organizations could use it as well and from that point on, adoption of the platform grew significantly, particularly in European and Latin American countries who seem more drawn to open source products than North American ones"*

At the time, Sloanspace was a pioneer in educational open source technology.[18] Today, the .LRN community, "An open source product to support learning and research communities",[19] has 25 university and research partners. As a result, MIT is able to use the community for support and general collaboration. Each member of the community develops and tests new modules and then makes the code available for the collaborative.

In addition, the cost savings of .LRN have been significant. Although there is no specific line item for Sloanspace, cost is allocated on a somewhat ad hoc basis where benefiting cost centers pay, Essa estimates that "over five years, we've spent roughly $500,000 to deploy, extend, and maintain .LRN. Our benchmarking suggests we've spent roughly 25% of the cost of similar systems built with commercial software or custom homegrown code."[20]

[17] http://www.dotlrn.com/case-study/mit-sloan/

[18] Blackboard's <http://www.blackboard.com> academic suite of programs is the most commonly chosen alternative to open source or customized programming.

[19] http://www.dotlrn.com/

[20] http://www.dotlrn.com/case-study/mit-sloan/

Although Open Source was largely successful, there were several problems. For example, the dependence of Open Source technology on "volunteer programmers" meant that Sloanspace has been unable to depend on these people for consistent timely improvements. However, the overwhelming benefits were deemed to outweigh these minor inconveniences. As the .LRN community continued to grow, MIT Sloan was optimistic that Sloanspace and other open source portals would be able to benefit from each other.

Current Status

In 2005, Sloanspace has a user base of over 15,000 people, about 2,000 of which are classified as "regular users." With about 1500 logins per day and 75% of Sloan class utilization, Sloanspace has largely been deemed to be a success. Those courses which do not choose to use Sloanspace are either PhD courses relying on class interaction, taught by visiting professors, or taught by "technophobes." However, the last category remains relatively small in comparison to the other two.

There are two main user groups:

- **Students**: The portal is primarily a student tool. They are able to access class materials, join discussion groups, and maintain their calendars.
- **Faculty/TA's**: Members of the faculty also have access to all the same features, but they use Sloanspace much less frequently. In general, faculty adoption of Sloanspace follows student demand. Professors and TA's use it almost exclusively to post course materials and send class wide e-mails.

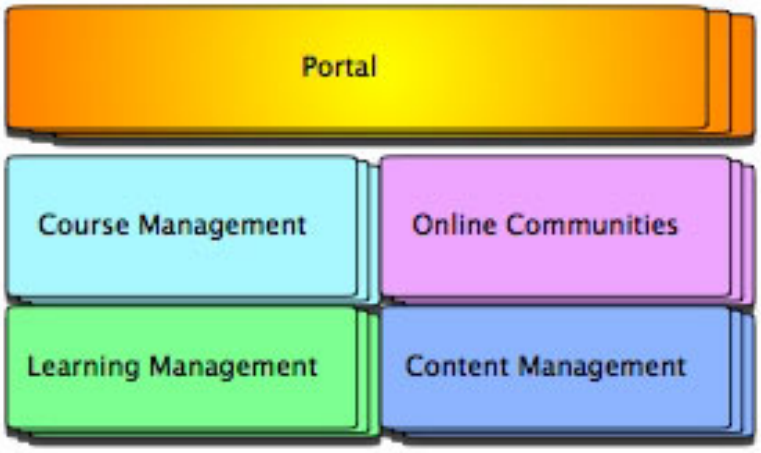
In addition to cleaning up "portal clutter" and general performance upgrades, plans for the next major functionality upgrade include a sitewide search tool. In addition, Sloan IT continuously solicits feedback from the user community to ensure that Sloanspace is still meeting user requirements. They do this through constant availability and even surveys on the Sloanspace site.

Sloanspace differs from traditional portals in a number of different ways. First, it is not a traditional portal in the sense that it is not integrated with any backend connections. Next, security is entirely login based. Even though the security is simple, Sloanspace has not had any problems. However, it is important to note that no truly secure data is kept on Sloanspace. Another key difference between Sloanspace and traditional portals is when users login, they all see more or less the same page.

Despite these differences, it is still an example of a thriving portal. The users are satisfied, and Dee reflected on the future of Sloanspace with optimism, "we didn't see the results right away during the adoption phase. However, we feel that Sloanspace is now a good stable environment to meet student needs."

.**LRN capabilities**

.LRN provides a complete portal framework along with out-of-the-box capability for course management, online communities, content management, and learning management.



Appendix F: University of Cincinnati's OneStop Case Study

MIT Sloan School of Management

Tiffany Kosolcharoen, Susie Lee, Adam Powell, & Armando Valdes

SAP Portal Implementation at the University of Cincinnati

In 2004, the Systems and Operations Division at the University of Cincinnati realized that it would soon face a problem. It had been fulfilling the needs of its users through mainframe systems that had reached obsolescence. Furthermore, they realized that they could better serve the needs of their users through offering an integrated portal solution, instead of a group of separate systems, as they had done previously. Recently, they had implemented a portal for the students of the University of Cincinnati using a software package called Blackboard. As a result of the positive reaction they received from implementing that portal, they decided that it was time to implement an administrative portal. As it was deemed that the most impact would be achieved by building functionality for finance and human resources, those areas were scheduled to be constructed first. In order to better meet the business needs of the University, it was decided that it was essential to create a last-generation portal.

Division Background

The Systems and Operations Division at the University of Cincinnati worked to aggressively meet the business needs of the University. Jim Lewis, the Assistant Director of Systems and Operations, achieved this goal through careful managing the division's human resources. The division was staffed through a combination of internal staff members and hired consultants from IBM. Previously, the department had largely made use of homegrown technologies. In order to better reduce costs and increase the ease of future upgrades, the division decided to move the University of Cincinnati to two commercially-available platforms. Blackboard was chosen for the student portal, while SAP was chosen for the administrative portal.

Definition of a Portal

While many websites are referred to as portals, different organizations have differing definitions of the meaning of the word "portal". In order to clarify understanding of the University of Cincinnati's vision when building its portals, Jim Lewis provided the following as the University's operating definition of a portal: "A portal is a one-stop-shopping site where users can access to all the resources they need."

Definition of Success

The University of Cincinnati had defined success for the portal from two standpoints: business and technical.

Attributes Needed for Business Success
-Achieves user buy-in
-Shows evidence of active usage by users
-Incorporates legacy systems in a manner that increases productivity
-Manages user expectations through defining clear metrics for performance, and then meeting them
-Defines scope, and then maintains it throughout the duration of the project
-Assists users in the transition process from legacy systems to the new system

Attributes Needed for Technical Success
To meet the technical objectives the team had set, they considered it important to build an easily upgradeable system that conformed to the latest standards. The division realized that would be a challenge given the amount of uncertainty in the area of technology, where the release date of third party products is not known and often delayed. As well, it was difficult to understand issues in compatibility with later versions in advance of their release.

Division Operations

While the final outcome of the administrative portal project was unknown at the time of the creation of this case, information about intended budgeting and staffing was provided. In total, approximately one-quarter million dollars had been allocated to the administrative portal project.

Category	Item	Cost
Software		**$125,000**
	Windows 2003 SQL licenses	$50,000
	Novell licenses for identity management & eDirectory project	$75,000
Consulting		**$125,000**
	IBM Consulting Services	$125,000
Total		**$250,000**

The University had not yet estimated the cost of training its employees to use the portal, but expected to train 950 to 1,100 people at the end of the second phase of the project, when the human resources module was implemented. Of these users, the staff anticipated that only 700 to 900 of them would regularly use the portal. As the number of people who had used tools after training has historically been substantially lower than the number of people trained, this had to be taken into consideration when negotiating licensing agreements with SAP.

University Staffing

In 2005, the University of Cincinnati had 15,000 full-time W2-S employees. Of these employees, between 6,000 and 8,000 were anticipated to use the web benefit enrollment module of the administrative portal, while approximately 1,100 were expected to use the financial and human resources modules by the end of their respective implementations. The uncertainty in the number of people who would use the portal not only strained the resources needed for training, but affected defining the number of licenses that needed to be obtained. The University had worked closely with SAP to negotiate licensing agreements, and had planned to procure 1,100 professional licenses for the HR module implementation. This number of licenses excluded the ESS (Employee Self Service) aspects of the project, which also needed to be licensed.

Training was considered to be a very high priority. While this may seem intuitive, the University had learned this from experience. In the 1980's, inadequate training was provided, and the systems that were implemented suffered as a result. In the administrative portal project, the team wanted to ensure that end user training was excellent so that there would be fewer problems with the usage of the portal when it went live. The goal of training was to ensure the portal was accepted by the community.

Portal Strategy

In 2005, the portal team worked to implement the following modules: finance, human resources (SAP human capital management system), COUHES, Employee Self Service (ESS), as well as other systems such as campus management and a campus ID system. The goal was to create a lot of value-added services in the beginning of the implementation, in order to increase initial impact and visibility, assisting in the achievement of consumer buy-in.

The University of Cincinnati created two portals: one administrative and one academic. The administrative portal would be based on SAP (see Exhibit 1), while the academic portal, using Blackboard (see Exhibit 2), provided information to students about the courses available and other information students need. The student information system that existed in 2005 (not a portal) was based on home-grown systems but was in the process of transitioning to the use of Blackboard. Of the two portals, the University felt that the administrative portal had a higher priority.

Cost had been a substantial factor in the decisions surrounding the creation of the portal. For instance, there were not enough resources to add search capabilities and implement legacy forms in the SAP portal, as was done by Los Angeles Community College. Training was also constrained by the budget. Although it was very easy and inexpensive to add some types of new features to the system, the implications in the cost of training staff to deal with the increase of complexity resulting from the features made some additions infeasible. Thus, the scope of the project had been greatly reduced due to the cost of training.

Technical Selection

The Systems and Operations Division of the University worked closely with IBM Consulting Services to find the right mix of technology to suit their business needs. In the end, the University decided to use the most current technology available.

At the time technology had to be selected for the portal, IBM's DB2, the University's database of choice, was not compatible with SAP R/3. Likewise, SAP's Enterprise Portal System (EPS) also did not support DB2. Thus, at the point of selection, the University was limited to two options: Oracle and Microsoft SQL Server. Since the existing infrastructure was more compatible with Microsoft SQL Server, and this infrastructure made it easy to accommodate the new technology, the choice was clear. At the beginning of 2005, the University of Cincinnati had a cluster of servers running Microsoft SQL Server as the backend database system for the portal.

Portal Implementation

The administrative portal would be implemented in three stages, modeled on the approach of Los Angeles Community College (LACC). While the model for implementation at LACC could not be fully utilized at the University of Cincinnati due to cost constraints, it was to be followed in order to implement components in such a way that added as much value as possible, in as little time as possible. The timeline for the project, created in November 2004, is as follows:

First Phase
July 1st 2005 – Launch of the finance portal and BW component.
July 2006 – Implementation of COUHES (Committee On the Use of Human Experimental Subjects) module and integration of the system to SAP Grants

Second Phase
Fall 2006 – Implementation of the human resources module, utilizing SAP's human capital management system
Fall 2006 – Implementation of the Employee Self Service (ESS) system and the Benefit Enrollment Module of the Human Capital Management (development in parallel with the HRM system)

Third Phase
Additional value-added services would be implemented after the second phase. These services included a Campus Management module and a Campus ID System. As of 2005, the utilization of third party systems had not been contemplated for these systems. However, the Systems and Operations Division had the overarching goal of using SAP throughout the administrative portal.

It is important to emphasize that the prioritization for the implementation of the modules in the system was solely based on business decisions, as adding value to the community was considered essential to achieving consumer buy-in. Even if the University had decided not to implement the portal, it would have been necessary to upgrade the financial system before working on human resources. Furthermore, creating the HR component at the beginning of the project would have been too much of a cultural change, and could have had negative repercussions for the rest of the project. As both the financial and HR systems had high end-user visibility, it was essential that the implementation of both go smoothly for the project to be

successful.

Portal Maintenance

In April 2005, the Systems and Operations Division sought an internal portal administrator to serve as a cornerstone of the project. As of that time, it was not yet possible to evaluate the maintenance of the project, as all of the people involved in the project were worried about the implementation and had difficulty documenting maintenance requirements. IBM Consulting Services had been employed to determine the resources needed to maintain the project, but since there were no users at that point, firm maintenance plans have not yet been created.

While the portal team attempted to avoid scope creep, there were some upgrades that were anticipated to occur. While the latest technology available at the time had been utilized in the design of the portal, the availability of newer platforms, such as NetWeaver ERP 2005, potentially could result in a platform migration occurring in 2006. Uncertainty surrounding the release date of new products presented a problem and had to be managed.

Community Reaction

As the Systems and Operations Division had primarily been focused on the development of the portal, user interaction had been minimal. However, the University's branding group had worked to ensure that the portal's interface maintained the look and feel of other sites associated with the University, and conformed to university standards. Effort had been dedicated to devising an interface that merged seamlessly with the community's expectations. In May 2005, the user acceptance phase of the project began. This phase was inaugurated by the training of users. Many presentations were made to inform the community of the development and progress of the portal, creating high user expectations for the outcome of the project.

Exhibit 1: SAP R/3 (from Wikipedia)

SAP R/3 is the name of the main ERP software produced by the SAP company. Its new (modern) name is mySAP (*http://www.sap.com/solutions/erp/*)

History of SAP R/3

SAP R/2 was a mainframe based business application software suite that was very successful in the 1980s and early 1990s. It was particularly popular with large multinational European companies who required soft-real-time business applications, with multi-currency and multi-language capabilities built in. With the advent of distributed client-server computing SAP AG brought out a client-server version of the software called SAP R/3 that was manageable on multiple platforms, which opened up SAP to a whole new customer base. SAP R/3, which was launched in 1992. The official launch date was 06 July 1992, which is why the Administration account created during the installation has the password 06071992, SAP came to dominate the large business applications market over the next 10 years.

Reasons for success

From the 1960s to the 1980s there was a concern that software development was too complex, and liable to go wrong. One of the solutions to this proposed by many people including Fred Brooks was the development of a modular approach in order to maximize software reuse.

SAP software comes with customizable processes which a company uses in the modeling of its business. Traditionally, software purchases had provided tools for building applications, but these tools did not provide business processes. SAP provided standardized processes, which were termed *best-practices* solutions of processes. The implementation of SAP software commonly required the expertise of knowledgeable external consultants, who were familiar with these best practices.

Organization

SAP R/3 is arranged into distinct functional modules, such as Sales & Distribution, Finance, Human Resources and Materials Management. Each module handles specific business tasks on its own, but is linked to the others where applicable. For instance, an invoice from the Billing portion of Sales & Distribution will pass through to accounting, where it will appear in accounts receivable and cost of goods sold.

SAP has typically focused on best practice methodologies for driving its software processes, but has more recently expanded into vertical markets. In these situations, SAP produces specialized modules geared toward a particular market segment, such as utilities or retail.

Using SAP often requires the payment of hefty license fees, as the customers have effectively outsourced various business software development tasks to SAP. By specializing in software

development, SAP hopes to provide a better value to corporations than they could if they attempted to develop and maintain their own applications.

Technology

SAP R/3 is a client/server based application, utilizing a 3-tiered model. A presentation layer, or client, interfaces with the user. The application layer houses all the business-specific logic, and the database layer records and stores all the information about the system, including transactional and configuration data.

SAP R/3 functionality is structured using its own proprietary language called ABAP (Advanced Business Application Programming). ABAP, or ABAP/4 is a fourth generation language (4GL), geared toward the creation of simple, yet powerful programs. R/3 also offers a complete development environment where developers can either modify existing SAP code to modify existing functionality or develop their own functions, whether reports or complete transactional systems within the SAP framework.

ABAP's main interaction with the database system is via open SQL statements. These statements allow a developer to query, update, or delete information from the database. Advanced topics include GUI development and advanced integration with other systems.

The most difficult part of SAP R/3 is its implementation. Simply because SAP R/3 is never the same. For instance, Atlas Copco can have a different implementation of SAP R/3 than Procter & Gamble and so on. For this, these companies recruit highly skilled SAP consultants to do the job. The implementation must consider the company's needs and resources. Some companies may like to implement only a few modules of SAP while others may want all modules.

SAP has several layers. The **Basis System** is the heart of the data operations and should be not evident to higher level or managerial users. Other customizing and implementation tools exist also. The heart of the system from a manager's viewpoint are the application modules. These modules may not all be implemented in a typical company but they are all related and are listed on the next page.

FI Financial Accounting

designed for automated management and external reporting of general ledger, accounts receivable, accounts payable and other sub-ledger accounts with a user defined chart of accounts. As entries are made relating to sales production and payments journal entries are automatically posted. This connection means that the "books" are designed to reflect the real situation.

CO Controlling

represents the company's flow of cost and revenue. It is a management instrument for organizational decisions. It too is automatically updated as events occur.

AM Asset Management

designed to manage and supervise individual aspects of fixed assets including purchase and sale of assets, depreciation and investment management.

PS Project System

is designed to support the planning, control and monitoring of long-term, highly complex projects with defined goals.

WF Workflow

links the integrated SAP application modules with cross-application technologies, tools and services.

IS Industry Solutions

combine the SAP application modules and additional industry-specific functionality. Special techniques have been developed for industries such as banking, oil and gas, pharmaceuticals, etc.

HR Human Resources

is a complete integrated system for supporting the planning and control of personnel activities.

PM Plant Maintenance

In a complex manufacturing process maintenance means more than sweeping the floors. Equipment must be serviced and rebuilt. These tasks affect the production plans.

MM Materials Management

supports the procurement and inventory functions occurring in day-to-day business operations such as purchasing, inventory management, reorder point processing, etc.

QM Quality Management

is a quality control and information system supporting quality planning, inspection, and control for manufacturing and procurement.

PP Production Planning

is used to plan and control the manufacturing activities of a company. This module includes; bills of material, routings, work centers, sales and operations planning, master production scheduling, material requirements planning, shop floor control, production orders, product costing, etc.

SD Sales and Distribution

helps to optimize all the tasks and activities carried out in sales, delivery and billing. Key elements are; pre-sales support, inquiry processing, quotation processing, sales order processing, delivery processing, billing and sales information system.

Exhibit 2: Blackboard (from Wikipedia)

Blackboard Inc. (NASDAQ: BBBB), http://www.blackboard.com) is a software company based in Washington,_DC, USA. Founded in 1997, Blackboard began as a consulting firm contracting to the non-profit IMS Global Learning Consoritum (http://www.imsglobal.org). In 1998, Blackboard LLC merged with CourseInfo LLC, a small course management software provider, to form Blackboard Inc. The first line of e-learning products was branded Blackboard Courseinfo, but the Courseinfo brand was dropped in 2000. Blackboard went public in June 2004.

Today, Blackboard develops and licenses enterprise software applications and related services to over 2200 education institutions in more than 60 countries. These institutions use Blackboard software to manage e-learning, transaction processing and e-commerce, and online communities. Blackboard's product line includes:

- The **Blackboard Academic Suite**, consisting of
  - The *Blackboard Learning System*, a course management system
  - The *Blackboard Community System*, a community and portal system
  - The *Blackboard Content System*, a content management system

- The **Blackboard Commerce Suite**, consisting of
  - The *Blackboard Transaction System*, a transaction processing (debit card) system tied to university IDs
  - The *Blackboard Community System*, an e-commerce front end for the Transaction System
  - *Bb One*, a network of commercial and retail business that accept Blackboard-powered debit card transactions

Blackboard also has an open architecture, called Building Blocks (http://buildingblocks.blackboard.com), that can be used to extend the functionality of Blackboard products or integrate them with other software systems.

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Appendix G: North Carolina State University's MyPac Case Study

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It is generally recognized that at this time administrative computing at NC State is non-uniform in nature. Different departments, colleges and central campus office use distinct network services, file systems, hardware, software and software versions. This has a continuing negative impact at all campus levels on our ability to achieve effective technical support, staff training and self-help, budget planning, help desk services, administrative processes and procedures, purchase/selection of computing hardware and software, application delivery systems, communications (such as use e-mail attachments), design of new services, and the overall complexity of our computing environment. The costs of maintaining this diverse environment are difficult to calculate, but increasingly technology service groups and administrative units are requesting common campus-wide standards to simplify the administrative computing environment.

Background

At the July, 1998 meeting, the University Standards Committee appointed a working group to develop an initial viability report and draft proposal for a standard administrative computing environment. The group has completed this work, and believes that it has broadly identified a standards framework that would allow significant improvements in communications and computer-based operations for administrative computing across campus, and that, if, approved, will enable the major university units, colleges and departments to establish a more cohesive and collaborative technology service infrastructure. This report summarizes the finding of this group, and is organized to reflect the original list of questions that the group set out to answer.

The initial focus of the Administrative Portal Project is to provide NC State faculty and staff easy access to administrative web applications and associated information such as help, training, and policies. The driving factor for NC State's PeopleSoft selection was security, for its current systems were all PeopleSoft systems.

Portal Strategy

A two-phased implementation approach was outlined. In its initial roll-out, the focus was to provide NC State faculty and staff easy access to administrative web applications such as HR, finances, etc. The PeopleSoft administrative portal will be fully integrated with the student portal by 2009. Currently it its pilot states, a future permanent provost will be the driving force for new releases.

A standard administrative computing desktop should consist of:

- A set of highly specific software and software versions that is recommended for all participants, and that is based on common, campus-wide, computing strategies and standards for networked computing, communications, and data formats.

- Recommended hardware specifications that will meet the common computing needs of participants in the campus administrative computing environment
- Processes and procedures associated with the effective implementation and enhancement of administrative computing standards
- A regulatory body to modify existing software and hardware specifications in response to evolving technologies and campus needs; to provide general management functions associated with administrative computing standards; and to ensure ongoing communications between participating campus units and support services
- Regulating mechanisms to ensure a "reasonable" rate of technology turnover, for example to ensure that hardware investments will remain viable for a predictable period of time
- Ongoing oversight and review by a representative campus body

Division Background

The Administrative Computing group at NC State provides IT support to the student, administration and business units. The group designs, implements, and maintains the technology infrastructure for the various NC State departments using the PeopleSoft technology.

The University Information Technology Committe was orginally formed in 1992 by NC State's Provost and the Vice Chancellor for Finance and Business as the North Carolina State University Computing Standards Committee (UCSC).The committee was restructured during the the spring of 2000 to give a greater voice to colleges and other key constituencies on campus. The restructured committee is a strategic policy-making body, although technical topics remain part of some discussions.

The University IT Committee meets six times a year.

Operational Costs

Cost was the biggest limitation. With a small implementation team of 12 people, one customer-focused team, and 50 key university stakeholders including business officers and general users, NCState needed to its key technical team, which spent the most time working on the portal.

As far as possible any initial standards should not require new hardware upgrades other than those already required by PeopleSoft and other widespread applications.

While individual departments and units have traditionally paid for their own technology investments, the work group noted that a business case could be made for centralized funding of administrative computing, which would significantly reduce the time/staff/paperwork costs associated with individual/office purchase of technology, and remove opposition to standards due to the perception of unfunded mandates.

The central funding approach simplified site-license negotiations, while a centralized software/hardware purchasing office provided a single point of communications/information, purchasing specifications, problem-resolution with vendors, etc.

Technology Selection

The hardware technology was on Oracle database servers. The environment for the Administrative Portal is similar to the current HR and Financials 8 systems. It will run on PeopleTools 8.43 and will consist of servers for the database (Solaris/Oracle), application servers (Solaris) and web servers (Solaris/Weblogic), and associated software. NCState's portal licensing costs were reduced relative to other systems because it used PeopleSoft servers.

Like the Barker University Case Study in the 15.568 Practical Information Technology Management class, providing services for multiple platforms raised a concern. Cross-platform compatibility will not be a condition for acceptance of specific administrative software as part of the standard, since this may simply not be feasible in some instances – rather consideration and approval of administrative computing standards will be the responsibility of the University Standards Committee.

The campus should define a standard hardware platform/OS for administrative services, and should encourage offices to meet these standards. Offices that elect not to embrace these hardware/OS standards must recognize that the cost to implement and deliver the recommended standard software to non-standard platforms would become their own responsibility, and may not be feasible in some cases.

Minor version upgrades might take place within relatively short time-windows, as long as there is some approval mechanism and sufficient notice to technical offices and staff who must make changes to effect the upgrade. Major upgrades, additions, or other significant changes that require training, significant testing and deployment efforts, or expenditures should occur within a well-established review process and deployment timetable.

Criteria applied to technology selection

- Applicability to administrative needs at all campus levels
- Scalability
- Interoperability with other standard software, security systems, etc.
- Long-term market viability
- Consistency with student computing environment where appropriate
- Hardware/OS constraints
- Client hardware requirements and associated upgrade costs
- Implementation costs/license agreements
- Maintenance costs
- Ease of support
- Required technical training and implementation timetables
- Staff training needs and timetable for transition
- Acceptable/predictable rate of technology turnover
- Overall rate of change in administrative environment
- Side-effects, such as modifications to existing processes and procedures
- General consensus/concerns

Timeframe

Budgets of departments and other units should not be at the mercy of this week's software release.

Departments and "end-users" should be assured that a hardware purchase that meets current campus standards will not need to be "significantly" upgraded for at least 36 months, that is, that no software or service changes will be introduced that force "premature" turnover of significant technology investments. On the other hand, central services must have the flexibility to upgrade strategic software in a timely manner when necessary to meet external deadlines and forces (for example, PeopleSoft version) or changes in reporting requirements.

Portal Potential: Establishing common standards for administrative computing

NCState decided it could not apply campus –wide standards for administrative computing. While it would be difficult to assess precise cost benefits, there can be little doubt that the potential savings when compared to continuing to do "business as usual" will be tremendous at all campus levels. For example:

- Improved budget planning, reduced costs, and more predictable rate of technology turnover for departments, colleges and campus units
- Cost effective and integrated technical support and help desk services
- Significant improvements in communications between administrative offices throughout the university
- Campus-wide standards for training, skill assessment and position requirements for our administrative staff, better skills transfer and opportunities for career advancement
- Development without leaving the campus environment, greater redundancy
- Greater opportunities to design and implement standard administrative procedures and processes
- Standards for off-campus access to services
- Synergy and collaboration

Critical Success Factors

1. Consensus Building and General Communications

A critical mass will need to be achieved in order to bring this effort from a written report to a meaningful initiative. Approval by the University Standards Committee must represent a clear commitment by the Deans or appropriate campus leaders of the represented colleges and units to recognize the validity and significance of campus-wide administrative computing standards. Assuming that agreement is achieved within the committee, the major hurdle will be to achieve consensus and manage change within each of the represented units and colleges.

The group generally agreed that the focus must be on *standards* for administrative computing and not on general computing within each department or unit. Apart from the diversity of computing needs, it is generally just not feasible to expect that individual faculty and staff will

agree to significant constraints on their desktop environment (there is of course no reason why an administrative standard desktop should NOT be adopted by non-administrative users where this is feasible).

2. Adoption of standard software/hardware vs. adoption of standard formats only

Standard formats will need to form an integral part of any overall standards definition since these will greatly simplify communications with non-participant in the standard environment (on- or off-campus).

A stepwise approach is needed to implement standards. Too much at once will create multiple points of failure, a chaotic support situation, loss of support for the initiative, and increased opposition. An orderly approach will:

1. Define general policy-making, mechanisms for updates/additions to standards, implementation timetables, review processes, communications, etc.
2. Define initial standards for hardware, desktop applications, communications software, file formats.
3. Announce strategies and initial standards and obtain support from units and colleges.
4. Define/plan/communicate expected implementation dates (formats, general applications, communications software, etc).
5. Define/develop cost-effective services based on standards (training, documentation, help desk, application delivery, etc.)
6. Implement ongoing review timetables, etc.
7. Review progress and services

There was some significant discussion within the work group with regard to e-mail and calendar standards. While the marketplace and standards environment is especially unstable, especially with regard to calendaring, we are nonetheless under some urgency to adopt a standard:

1. The increasing implementation of a number of different solutions for calendar/scheduling across the campus which will make standardization and migration increasingly difficult.
2. The implementation of IMAP services and increasing use of Unity/NDS accounts necessitates a migration of many offices and units from e-mail systems currently in use, so that timing is right to adopt a standard.
3. Network Client Services is preparing to upgrade their e-mail and calendar systems at this time, and have indicated flexibility in order to achieve a common standard.
4. Colleges such as CALS need to establish and implement e-mail/calendar standards, but cannot do so in the absence of a campus-wide standard, without running the risk of increasing the complexity of the overall campus environment.

3. Reluctance to change.

Offices, faculty and staff are likely to be concerned about the effort to change current systems and services, and to learn new software, etc. There is nothing new about adjusting to technology changes. The problem right now is that these changes are non-uniform, and are not made in the context of the overall technology environment. A common change to meet a campus standard generates an initial "bump" for participants, but then permits orderly change – once a standard is achieved, we should expect to see a reduction in the unpredictability and frequency of changes in our environment.

4. Fear of losing control, or of being constrained by other campus constituencies.

Departments will be reluctant to adopt campus standards without reassurance that they won't lose more control over their budgets, technical support resources, staff activities, etc. On the other hand, campus/college service providers may also be reluctant to work within new constraints imposed by hardware/software standards.

Success in this effort will depend on a spirit of cooperation throughout the campus: on the one hand, cooperation from offices, departments and technical service staff to support "reasonable" efforts to establish and maintain common (mainstream) standards and systems; on the other hand, recognition by campus standards-making bodies and computing services that our departments and offices should expect a predictable and cost-effective rate of software changes and hardware turnover, as well as support to integrate new systems.

5. Concern that focus is on administrative computing standards only.

This is likely to be of concern for departments and units that currently maintain a consistent internal computing environment for effective communications and technical support, and that wish to maintain this internal consistency.

This has not however been identified as a general concern, and significant concerns have been raised in the other direction – there are many reasons why administrative computing should not be applied to the larger computing environment. The approach of the committee should therefore focus on administrative offices, and it should be left to colleges and departments to decide whether these may be usefully applied more broadly.

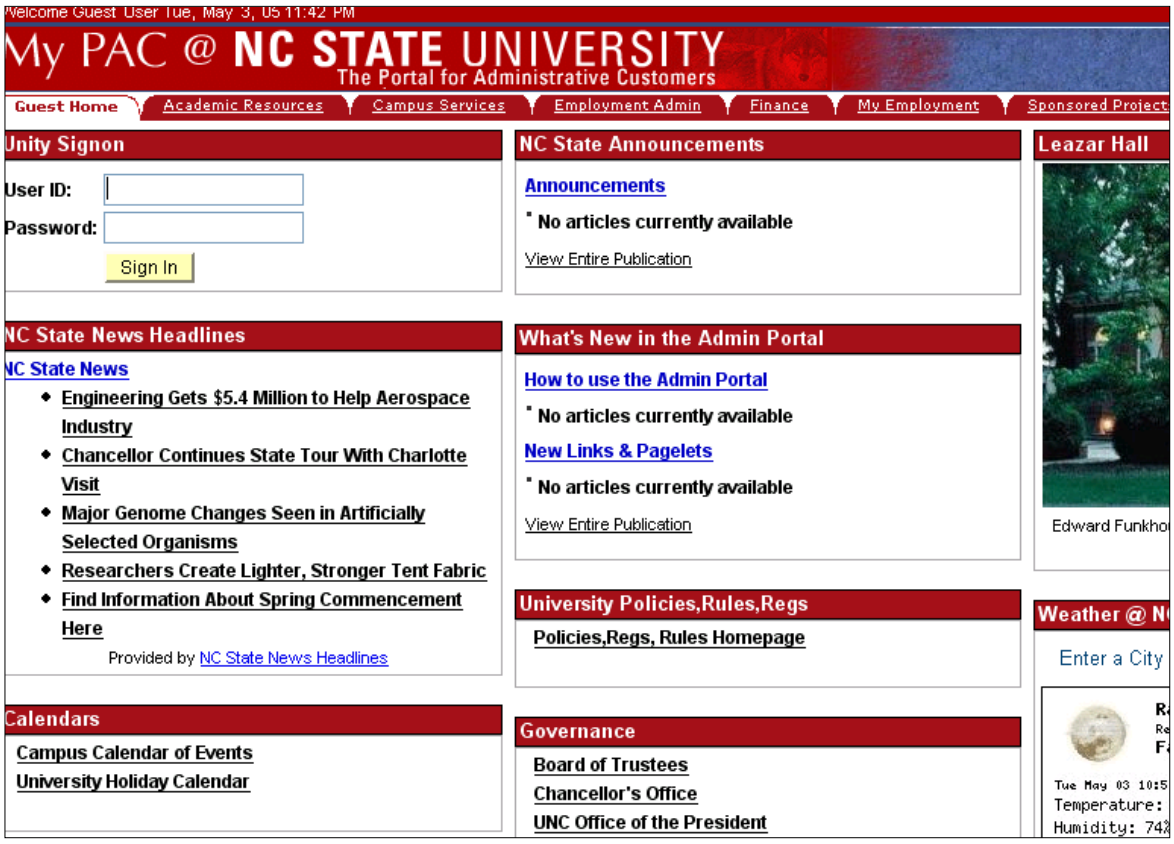
6. Concerns of technical staff.

Technical staff worked hard to develop service solutions for their clients over the past few years in a campus environment that has not encouraged adoption of standards. In some cases, technical staff may be concerned about accepting a generalized solution that is likely to require changes in the systems that they must support, that may be seen to compete with their personal efforts to define standards for their clients, or that might be perceived as threatening their own professional position within the institution.

7. Departments and units may decide that they will not or cannot participate in standards at this time.

Administrative offices or units who elect not to participate in a campus-wide standard for administrative computing will keep informed on the current standard formats defined by the campus for document exchange with other units, and will work cooperatively to meet these standards for effective communications.

Note that offices or units that cannot meet the standards, will still benefit in three important ways: (1) knowing more clearly the general campus environment with which it must interact; (2) having a clear path to follow re: future technology strategies; (3) knowing what standard formats are to be implemented for effective communications with other campus offices.



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