15.568 PRACTICAL IT MANAGEMENT

MIT SLOAN SCHOOL
SPRING 2005

Cyrus F. Gibson, Sr. Lecturer  1 Feb 05
BT AS A DRIVER OF ISSUES: WHY “TRANSFORMING” IS NOT EASY

LEVEL OF TRANSFORMATION REQUIRED

Culture
Strategy
Structure
Procedures
Skills

TIME TO ADJUST

Years Months Weeks Small Large

MAGNITUDE OF CHANGE

Source: Adler, P.S., Shenbar, A., “Adapting Your Technological Base: The Organizational Challenge”, SMR, Fall 1990
3 ERAS OF IT CONTEXT

- DP Era (1960-1975)

- Business Value of IT

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THE ROLES FOR IT IN AN ORGANIZATION

OPERATIONAL IMPORTANCE OF IT

<table>
<thead>
<tr>
<th>HIGH IT “FACTORY”</th>
<th>INFORMATION BUSINESS</th>
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<tr>
<td>NON-CRITICAL SUPPORT</td>
<td>TRANSITION OR “VIRTUAL ORG’N”</td>
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LOW COMPETITIVE IMPORTANCE OF IT

## GETTING BUSINESS VALUE FROM IT: THE BENEFIT-BENEFICIARY MATRIX TO TARGET CHANGE

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<thead>
<tr>
<th>Beneficiary</th>
<th>Individual</th>
<th>Functional Unit</th>
<th>Whole Organization</th>
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<td>Benefit</td>
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<td><strong>Efficiency</strong></td>
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<td>Mechanization</td>
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<td><strong>Transformation</strong></td>
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<td>Expansion</td>
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Questions and other assignment points for Thursday:

Read and prepare for discussion the case, "Royal Caribbean Cruises Ltd.". If possible, meet with at least one other class member (or a new member whom you may ask to read the case and come to class for the first time) and discuss. Consider the following questions:

1. Which of Murphy's three options (page 14 of the case) do you recommend he follow? Why?

2. Consider the topics of the five major modules of the course, as listed in the syllabus. What are the most significant one to two lessons about each topic which you believe are most important for the senior management of RCCL to learn and take into account going forward? (EG, for "project management", module I, you might choose, "Shape your IT projects and all projects with contingency alternatives. Your business is too subject to uncontrollable sudden change to sustain massive, long-term projects.")

In addition to discussing the case, we will examine the frameworks applicable to IT management in the PowerPoint file on MIT Server. No additional preparation of those is necessary.
Class 3: Administrative Data Project (A)

Questions and other assignment points for Tuesday:


Prepare for discussion: Administrative Data Project (A) (HBS 9-803-051)

Consider the following sections:

1. Using the ten principles from the Randolph and Posner article, evaluate the work so far and the direction of the Administrative Data Project: What has been done well? What has been done poorly?

2. What steps should be taken, and by whom, with respect to the ADP? Be as specific as possible.

3. Would the Randolph and Posner article have been useful to project management in IT at Royal Caribbean Cruises? Why or why not?
Class 4: Administrative Data Project (B) (C)

Questions and other assignment points for Thursday:


Prepare for discussion: Administrative Data Project (B) (HBS 9-803-052), and Administrative Data Project (C) (HBS 9-803-053)

Consider the following questions:

1. Why has the Administrative Data Project continued to be extended without really achieving its intended financial goals?

2. Is the project a success or failure at the time of the "C" case? What should be done now to make it a success?

3. In retrospect, what should have been done differently from the outset, May 1993, to have improved the chances of a full success? Use the De Meyer et al article to help you think about alternative ways to plan and manage the project.
Questions and other assignment points for Tuesday:

Visit the Project Management Institute (PMI) website and look over the Project Management Body of Knowledge book. The goal is not to read the whole document but instead to get an idea of the topics that are covered. You can download an excerpt of the latest edition at: http://www.pmi.org/info/pp_pmbok2k_conf.asp

Note: You can also download it from the Readings folder: Class 5 - Project Management Body of Knowledge Guide

Prepare for discussion: AIRNow case (available on MIT Server)

Consider the following questions:

1. List the factors that made the AIRNow initiative successful.

2. What parts of the approach would you have managed differently if you were the project manager?

3. What advice would you give Chet Wayland and Phil Dickerson as they take on other air pollutants?
Questions and other assignment points for Thursday:

Review all the articles and references assigned for this module (Randolph & Posner, DeMayer et al, and overview of the "Product Management Body of Knowledge").

Prepare for discussion: "Pharmaco Case A" (available on MIT Server)

Our visitor will be Ben Porter, independent consultant.

Consider the following questions:

1. What is behind "the problem" and the points listed under "a surprising analysis"? That is, what are the causes of the problem and those points?

2. What alternatives for action do you see for Hanson? What should he do?

Note: Your first short paper may be written based on this class. If you choose this one, which is one of five classes in the course from which you must choose three on which to write the paper, it is due on Thursday, Feb. 24th (electronically via MIT Server) by the beginning of class. You should upload the paper in the Homework section under folder “Module I”. (Other specifications for the short papers may be found on the online course syllabus.)

Make the short paper a memo from you to Ben Porter, advising on what should be done next at Pharmaco, based on the A case and other material which will be handed out in class, and also making reference as you see appropriate to other cases and to the readings we have had thus far in this course. Your memo should reflect not only the readings, but will be assessed particularly on how well you a) reflect the class discussion, and b) go beyond or critically assess the class discussion as a basis for your recommendations to Porter.
Questions and other assignment points for Thursday:

Read all the assigned articles:


Prepare for discussion: "First National City Bank Operating Group (A)" (distributed in hard copy in class on 17 Feb.)

Consider the following questions:

1. How important to the business of FNCB is it to make a major change in the Operating Group? Who among the following in the organization think so: top management, Operating Group middle management, Operating Group personnel?

2. How does the plan for change envisioned by Reed, White and White's immediate managers compare to the approach advocated by Hammer for re-engineering?

3. What else, if anything, should White and/or Reed do before going ahead with the changes described?
Questions and other assignment points:

Review the two articles assigned for last class:


Prepare for discussion: "First National City Bank Operating Group" (A-1) and (B-1)

Consider the following questions:

1. Review the (A) case and our discussion conclusions from the previous class. Read the (A-1) case carefully. Before reading the (B-1) case, as best you can with the data and assumptions you have at this point, do two quick and dirty analyses as follows:

   a) Compare the changes being pressed by Bob White in the "front-end" of the DDA process in Area I, as of August, 1971, the end of the (A-1) case, with the principles and other relevant recommendations of reengineering in the Hammer article. Create two columns to do this: one headed "Reengineering" and the other "Area I Change " and be prepared to discuss the differences row by row.

   b) Apply the change management assessment. What is your assessment of the risk, or likelihood of successful business change? What mitigation should be undertaken, if any, before the change is executed? What project management approach does White and his managers appear to be using? Is it the appropriate one here?

2. Read the (B-1) case. Go back and do the above two exercises more carefully, now in retrospect that you have more data of the context and know what happened after the changes were introduced. Why did the blowup occur in September 1971?

3. What should have been done differently?

4. What would you advise Reed to do at the time of the (B) case, January 1973?

NOTE: Your teams should be thinking how to apply the lessons and analytical tools from this module to your project.
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Class 9: Dow Corning (A), (B), (C)

Please note: Project plans are due on Thursday March 3rd before class starts. Upload them on MIT Server under the folder named Project Plan and use the following naming convention: Team_X_ProjectPlan (where X is your team number). Only one member needs to upload the file to MIT Server!

Questions and other assignment points:

Read the assigned articles:


Prepare for discussion: "Dow Corning" (A), (B), (C)

Consider the following questions:

1. What are the key strategic issues and opportunities for Dick Hazleton and his top management team at Dow Corning in 1994? What are the implications of the business direction for the strategic role of IT?

2. Assess the IT function at Dow Corning in 1994. What did it do well? How well was it suited for addressing the business implications (question 1) going forward?

3. What key actions were taken in 1995 by top management and the new head of IT, Charlie Lacefield? Do these actions align with your assessment of what was needed?

4. Evaluate the implementation of Project Pride at the time of the (B) case. What risks are involved in accomplishing the full implementation of SAP and the achievement of the full scope of operational business process reengineering as intended? What recommendations regarding the project would you make? Compare the management of the project over different phases, as described for Dow Corning in the Gibson article ("IT-enabled Business Change"): does the evidence in the cases provide you with enough to make you comfortable with the way the article uses the case?

5. Describe the strategic role of IT at Dow Corning at the end of the (C) case. What changes in that would you recommend going forward? What recommendations would you make regarding how Dow Corning can achieve the full benefits of the SAP implementation going forward?
The Sociotechnical System and Its Outcomes

- Strategy
- Structure
- Systems (esp. incentives)

- Skills
- Staff
- Style
- Shared Values

Organizational Culture ➔ Individuals’ Perspectives ➔ Work Behavior ➔ Business Results
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Class 10: EMC

Our guest will be Mike Shanno, representing the IT group at EMC Corporation.

Questions and other assignment points:

Read the assigned articles:

- EMC Corporation, ”EMC Overview”
- Accenture, ”EMC Squares Off for Future Growth”, 2001

Assignment:

Review all the articles assigned in this module (Hammer, Gibson, Brynjolffsen et al, Kaplan et al) the Dow Corning cases, and the "sociotechnical model" from the last class.

Review the presentation slides to be used by Mike Shanno. Read carefully the two articles posted for this class about EMC.

The short paper assignment based on this class is to write a memo to Mike which first provides a selected, focused critique of the implementation process at EMC, including some references to similar aspects at Dow Corning Corporation, and then second which makes recommendations for what you think should be high priority next steps for EMC with respect to its implementation and change process going forward. In place of the recommendations, we may come up with specific questions during the session with Mike which are to be addressed.
**EMC Overview:**

EMC Corporation, the world leader in information storage and management, celebrated its 25th year anniversary this past August, commemorating two and a half decades of substantial growth, innovation, and leadership. Founded in Massachusetts in August 1979 by Richard Egan and Roger Marino (the "E" and "M" in EMC), EMC has grown into one of the fastest-growing and most successful major information technology providers in the world.

EMC Corporation is the world leader in **products**, **services**, and **solutions** for information storage and management. Its solutions and services help organizations of all sizes and across the globe better and more cost-effectively manage, protect, and share their information. EMC’s 2004 lineup of tiered storage platforms represents the industry’s broadest offering, at prices spanning $10,000 to $2.5 million. EMC’s vision is to create the ultimate information lifecycle management company—to help its customers get the maximum value from their information at the lowest total cost, at every point in the information lifecycle.

EMC customers include the world’s largest banks and financial services firms, Internet service providers, manufacturers, healthcare institutions, life sciences organizations, telecommunications providers, airlines, transportation companies, educational institutions, regional and national government agencies. EMC finished 2003 with total consolidated revenues of $6.24 billion, up from $5.44 billion the year before. Net income for the year was $496 million or $0.22 per diluted share. The balance sheet, already strong at the beginning of the year, grew even stronger. Cash and investments grew to $6.9 billion at year end, up from $5.7 billion the year before—even after the company spent $127 million to buy back 11.5 million shares of EMC stock.

EMC employs more than 7,000 employees in its home state of Massachusetts and more than 21,000 employees in more than 50 countries worldwide. Since 1998, EMC has acquired 15 companies.
Class 11: RFID

Our guest will be Prof. Brian Subirana, MIT Sloan School and IESE Business School, Barcelona.

Questions and other assignment points:

Download and read the paper:


Also read, posted on MIT Server:


Come to class prepared to answer the following question:

How will the grocery distribution industry be transformed in the next 20 years because of RFID?

In particular, individuals should focus on the following specific questions:

(Janice, Ashvini, Harel): How will the business model of Peapod.com change?
(John, Jennifer): What does all this mean for Amazon?
(Jessica, Jose): What does all this mean for Wal-mart?
(Susie, Adam): What does all this mean for Fridge manufacturers?
(Armando, Tiffany): What does all this mean for Wholesale distributors?

NOTE: There are two additional optional articles from CIO Magazine (available on MIT Server) which we recommend to those of you with particular interest in RFID, and particularly the implementation issues:

"The RFID Imperative".
http://www.cio.com/archive/120103/retail.html

"Tag, You're Late: Why Wal-Mart's Suppliers Won't Make the January Deadline"
http://www.cio.com/archive/111504/rfid.html
Class 12: CareGroup
Tuesday March 15, 2005

Note: Module II memo due

Questions and other assignment points:

Read the assigned articles:

1) "Make it simple: A survey of information technology" The Economist, October 30th, 2004


Prepare for discussion: CareGroup (HBS 9-303-097)

1. What happened at CareGroup? Why did it happen? Explain in words and concepts that reflect the two articles assigned for today.

2. Looking at the "lessons learned", what would be your top three most important?

3. What else would you recommend to Halamka, to the CEO, and to the Board of Directors of CareGroup?
Class 13: LifeLine
Thursday March 17, 2005

Visitor: CIO Rich Reich

Note: Project Status Report due

Read the assigned article:


Prepare for discussion:

Lifeline Systems, Inc. – The CareSystem Project (on MIT Server). Last page hardcopy handed out in class on March 10).

1. Given the three phases of Lifeline Systems’ life as a business, what are two critical success factors (ie, things which must go right or be managed well) for each phase? What has to be done well to make the transition to the “information exchange” phase?

2. What were the three or four key decisions made leading to and during the CareSystem project? Do you agree with those? Why or why not?

3. ("Jurassic thinking"; don’t avoid it!) What risks and problems could prevent the fully successful operational implementation of CareSystem at the time of the case? What action steps would you recommend?

4. ("Subirana thinking"; embrace it!) Assume CareSystem is successfully implemented. What are some ways Lifeline could exploit its competitive capabilities over the next five years to achieve high levels of growth and profitability?

5. Here is a note from Rich Reich:

In the past year we completely redesigned our web site (www.lifelinesys.com) - it is now very rich in content. There are even some animations on how the service works. If you click on the investor relations link you can get to News releases, fundamentals, annual reports and SEC filings. A tremendous amount can be learned about the company. There also is a way to get an audio file of the last investor conference in which we discuss our latest earnings release. Starting at the investor relations link, click on calendar of events, then click on Past events then click on the Q4 2004 Lifeline Systems Earnings conference call - you then have to register and you can listen to an actual session with the president and CFO. (The audio file is also available on yahoo finance.)

How well is Lifeline doing as a business? What is the role of IT in its strategy? (See the "Strategic Grid" matrix from an early class.)
The purpose of this class is to engage in discussion of the projects in order to learn from each other the content, direction and issues going forward, to provide helpful suggestions, and to heighten the ultimate quality and value of the projects.

Read and be familiar with the project plans and first status reports (with instructor feedback comments) of every project. The projects will be made available on MIT Server.

Come to class prepared to present in an informal way the purpose, approach, status and next steps of your project. Discussion of each project should take approximately 20 min. A few slides to introduce the project and lead the discussion will be sufficient. Also be prepared to comment on and ask questions about the other two teams' projects.

Steve Winig, our overall liaison from IS&T, will join us for the class, but the specific project champions will not.
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Class 15: Tata Consultancy Services
Thursday March 31, 2005

Visitor: Mr. Arup Gupta CEO TCS Americas

Read the assigned articles:

- Outsourcing IT: The Global Landscape in 2004 (HBS 9-304-104)
- Gibson, C.F. & Nolan, R.N. “Managing the Four Stages of EDP Growth” HBR, Jan-Feb 1974

Visit the company website (www.tcs.com) to learn more about the services and products that TCS offers. In addition, go over the Press Releases for the last year (http://www.tcs.com/investors/InvestorRelations/PressReleases.aspx)

Attend the lunch presentation on IT Outsourcing by Mr. Gupta (if possible)

The presentation will take place on Thursday March 31 at 12:00PM. Food will be served so try to be there ahead of time. Please read the 2nd page for more info on the presentation and the speaker.

Prepare one slide for discussion and presentation:

Review all the articles assigned for this class and the ones we have covered so far in the course. Based on all the course readings prepare one slide that presents what you consider to be the three most important lessons learned so far. Each student will present their one slide explaining why the lessons are important to them and providing examples and/or references as to where these lessons came from.

In addition to the slide be ready to answer any questions that Mr. Gupta may raise during the class and make sure that you participate in the class discussion. Please note that the short paper assignment (for Module III) will be based on this class. The assignment will be a memo to Mr. Gupta that addresses the questions that will be raised during class and will be due on Thursday April 7th.
Outsourcing: A vendor's perspective

Most of the articles and research on outsourcing are based on the viewpoint of the outsourcing firm. The classic theme of build versus buy versus partner is prominent, again from the viewpoint of buyers. In this talk, the speaker will attempt to present outsourcing from a vendor's perspective.

You will not find this viewpoint to be radically different yet the talk will provide a different flavor on the outsourcing industry.

Among other topics, the talk will address the benefits and risks associated with outsourcing and also why it doesn't make business sense to do the same tasks in house. The value proposition from a vendor's perspective is presented and also the trends as observed in the IT Outsourcing industry. While the business case for outsourcing would be established through economic and/or market gains, local sensitivities and concerns would also be addressed from the perspective of global vendors. Finally, the talk will end with some pointers from the presenter towards ensuring a successful outsourcing engagement.

About the Speaker

Mr. Arup Gupta, President - TCS America

A Master in Computer Science from the Indian Institute of Science, Mr. Gupta is a veteran with over 25 years experience in the company. He joined TCS in 1979 as a software programmer. Rising quickly through the ranks, he assumed the role of Head of TCS Delivery Center in Mumbai, turning it into one of the largest offshore delivery center in India. Mr. Gupta took over the reigns of TCS America in 1999. He has been responsible for the exponential growth in revenues and manpower, transforming TCS America into a billion dollar behemoth.

About Tata Consultancy Services

Tata Consultancy Services (TCS) is a leading global IT services provider and was the first billiondollar Indian IT services organization by annual revenues. Since its inception in 1968, TCS has pioneered many of the significant developments in the Indian IT services industry, including the offshore delivery model for IT services. It has successfully extended this proposition to provide global engineering services to nearly 100 customers around the world.

TCS is a global organization with offices in 32 countries and development centers in 10 countries. TCS offers a comprehensive range of IT services to its clients in diverse industries such as banking and financial services, insurance, manufacturing, telecommunications, retail and transportation. TCS clients comprise of some of the world's largest and well-known organizations. TCS has developed extensive experience in providing end-to-end IT services, integrating multiple technologies and delivering solutions in multiple geographies for its global clients. It is the largest Indian IT services organization in terms of revenues as well as profits.

TCS is part of the Tata Group, which has a heritage of over 135 years as one of India's leading corporate groups. The Tata Group has interests in a diverse range of industries, and had combined sales of approximately Rs. 654 billion (US$14.25 billion) in fiscal 2004.
This will be a special class on getting business value from IT management frameworks.

Read:


(*Note: The first two readings are posted on MIT Server. The case originally shown for this class, "United Parcel Service", will not be posted or discussed in this class.)

Come to class prepared to begin class and discuss answers to the following questions:

1. Understand and be prepared to briefly describe the three following frameworks: The IT asset portfolio (see reading by Weill and Broadbent, "The Evidence for Business Value" in the coursebook), the stages of architecture maturity, and the IT governance matrix.

2. How could an understanding of each framework and its associated practices by the senior managers of a company contribute to business value? That is, if those managers were familiar with each of the frameworks and successfully introduced them to their company, how could they be used to improve any particular business results?

3. How should senior managers implement each of these three frameworks and the associated practices? Pick one of the following case situations and one of the three frameworks and illustrate your answer with reference to how you would recommend it be implemented there: "Baker University", Dow Corning Corporation, Lifeline Systems.

4. How would you describe the "mind set" and the behavior most appropriate for senior managers to have to best take advantage of IT for business value in general? Of IT for operational (day-to-day, repeated work and processes) business value? Of IT for competitive (new, innovative, transformational) business value?
Our visitor will be Prof. Thomas Malone, leader of research on the MIT Process Handbook, a repository of knowledge and cases and a tool for organizational and work improvement.

As preparation for the class:

1. Read the "The Process Handbook Vision":

2. Review the Dow Corning cases and the First National City Bank cases. Think of how you could have used the process handbook resource in those situations. This will be a special class on getting business value from IT management frameworks.
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Class 18: Tuesday, April 12, 2005

Enterprise Application Integration
Web Services and Business Process Management

As preparation for the class:

1. Review the concepts covered during last class from Professor Malone.

2. Review the following article available in the course reader:


3. Read the following article:


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Class 19: Tyco International Ltd
April 14, 2005

Visitor: Mr. Dana Deasy, SVP & CIO Tyco International Ltd.

Read the following articles:

"What a Job" published on August 25, 2003 in Information Week
http://www.informationweek.com/story/showArticle.jhtml?articleID=13100972

"Tyco's IT Turnaround" published on June 7, 2004 in Information Week
http://www.informationweek.com/story/showArticle.jhtml?articleID=21401517

"New Kid on the Block" published in the Fall 2004 edition of CIO Insight
http://www.cioinsight.com/print_article2/0,2533,a=137769,20.asp

Visit the company website (www.tyco.com) to learn more about the services and products that Tyco offers.

Attend the lunch presentation on “The Tyco Turnaround Story” by Mr. Deasy (if possible)

The presentation will take place on Thursday April 14 at 12:00PM. Food will be served so try to be there ahead of time. Please read the 2nd page for more info on the presentation and the speaker.

Prepare one slide for discussion and presentation:

Review all the articles assigned for this class and the ones we have covered so far in the course. Based on all the course readings prepare one slide that presents what you consider to be the two most important lessons learned so far. Please make sure that you consider the extra material that we covered since the last slide you prepared. In addition, please mention a single learning from your project and be prepared to discuss your project and the progress you’ve made.

A number of students will be selected during class to presents their slide to Mr Deasy and the rest of the class.

In addition to the slide be ready to answer any questions that Mr. Deasy may raise during the class and make sure that you participate in the class discussion. Please note that the short paper assignment (for Module IV) will be based on this class. The assignment will
be a memo to Mr. Deasy that addresses the questions that will be raised during class and will be due on Thursday April 21st.

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**The CIO/CTO Speaker Series Presents:**

"The Tyco Turnaround Story"

Dana Deasy, SVP and CIO, Tyco

Thursday, April 14, 2005

12:00 – 1:00 PM

Lunch Provided

Dana Deasy has been a key member of the small management team that has been running Tyco since the scandals of a few years ago. He and his colleagues represent a leadership team operating under pressure and under scrutiny from outside. Their story provides a remarkable case study of a turnaround with very positive signs of progress. Dana's role as corporate CIO has put him on the critical path to creating new sources and flows of information critical to the turnaround and to the continuing success of the operational businesses that make up this $40bn conglomerate.

**About Dana Deasy**

Dana Deasy has been the Senior Vice President and Chief Information Officer of Tyco International Ltd. since August 2003. He is responsible for developing overall global information technology strategy as well as for
implementing technology to improve Tyco's competitive position globally. Prior to joining Tyco, Mr. Deasy was Vice President and Chief Information Officer of the Americas at Siemens Corporation, Chief Information Officer of General Motors Locomotive Group, Director of Information Systems for Invetech Company and Director of Information Management for Rockwell Space Systems Division Space Shuttle Program.

About Tyco
Tyco International Ltd. is a $40B diversified manufacturing and service company, the world's largest manufacturer and servicer of electrical and electronic components and undersea telecommunications systems, the world's largest manufacturer, installer, and provider of fire protection systems and electronic security services, has strong leadership positions in disposable medical products, plastics, and adhesives, and is the largest manufacturer of flow control valves.
Class 12: ACE  
Thursday April 21, 2005

Note: Module IV memo to Mr. Dana Deasy due

Questions and other assignment points:

Prepare for discussion the “ACE” case that is available for download on MIT Server. Prepare for discussion the three questions at the end of the text of the case. We may have a visitor familiar with the case situation, and who can serve as a representative of Homeland Security and Customs and Border Protection to hear your discussion and recommendations.

In addition, read the assigned article:

Read the following articles:

Treacy, M. & Wiersema, F., Customer Intimacy and Other Value Disciplines, HBR, Jan-Feb 1993 pp 84 93


Review the article assigned last Thursday:


Come to class prepared to discuss the following:

1. From these articles and other reading or courses you may have had, what is "business strategy"?

2. In what ways do these articles reflect the impact of information technology and digitization on industries and the competitive landscape for a business?

3. List what you think are the three to five most important principles, maxims, and/or steps which you would recommend a company follow in its business strategy to succeed long term in the face of continuing importance of IT and digitization. If possible, indicate the counterpoint to your point to crystallize its meaning.

(For example: "Align your IT investments and IT architecture with the primary value discipline of your business; eliminate or minimize the exceptions to promote focus; avoid excessive experimentation and exceptions to this alignment for applications systems.")

In developing your list, think about the items on it would be understood and received by the top executives of a) Lifeline, and b) Customs and Border Protection, c) any other company or institution you are familiar with or have studied.

(Note: you are encouraged to discuss the development of your list with a teammate or other members of the class.)
4. As a class exercise, we will consider several current examples of actual organizations. These will be presented to you in class and you will be asked to be a consultant to apply your list to their situation in a dialogue with the "CEO".
Class 22: Thursday, April 28, 2005

Prepare for discussion:

"Enabling Business Strategy with IT at the World Bank", HBS case #9-304-055

We will discuss the case for the first part of the class, then tie in to Mr. Omar Baig at the IFC/World Bank for a conference call discussion.

1. Refine your list of maxims or steps for assessing and guiding the development of business strategy in relation to IT, as prepared for and discussed in our class on Tuesday, April 26.

2. Apply your list of maxims or steps as criteria to the process of IT change at the World Bank as described in the case. How did they follow or not follow your list? What other characteristics of strategy and IT mentioned in the four articles used for Tuesday's class are illustrated or not illustrated in the case?


4. Put yourself in Muhsin's position in the last paragraph of the case. What are some new and innovative things the Bank should consider to increase the leverage of IT internally and in the developing countries of the world?

Note: You may write a short paper on this class, the final short paper of the course, in the form of a memo to Mr. Baig. We will specify the assignment during our discussion with him. It will be due at class time on Thursday, May 5.
The Roles for IT in an Organization

Exec question: Where is our organization on this grid?

Adapted from Cash, J.I., F. W. McFarlan, and J. L. McKenney, Corporate Information Systems Management. 2nd edition, Irwin
Future Value: Where are you headed?

Strategic Enablement by IT?
“We’re Becoming a Software Company”

Commoditization of IT?
“IT Doesn’t Matter”
Over the past year and a half the question of the strategic value of IT for businesses has been a hot topic. Given the slow recovery of IT investments since the dotcom bust and the continuing decline in cost per unit of performance of processors, storage and telecommunications, some see IT approaching commodity status, available to all firms and offering competitive advantage to none. Others say commoditization of the elements of IT, even if true, does not translate to the commoditization of the uses of IT. The debate has settled in recent months, but the strong views on both sides have forced a fresh examination of the value of IT and how it should be organized and managed.

Come to class prepared to take a basic position for or against Carr's argument.
On the Spot at Dynamix Enterprises

As a new employee of Dynamix Enterprises, you have been asked by your boss, Marv Dillon, the Chief Operating Officer, to help him respond to an issue of contention between the president of the largest division, of the company, Dyninvest, and the Chief Information Officer of Dynamix.

Dynamix is a diversified financial services company which has grown by acquisition from its core business, an old New England bank. Of the eight operating divisions, six are virtually intact from when acquired, including Dyninvest, the second largest division and fourth most profitable. All division presidents report to your boss Dillon, the COO. Businesses include an investment bank, consumer financial investment and money management (Dyninvest), and several on-line information services to particular industries. Dynamix is publicly traded, had 2004 revenues of $2.5 billion, and has experienced an average of over 15% growth in recent years. Profitability has lagged, largely as a result of the unanticipated heavy costs of integrating information technology infrastructure to achieve expected efficiencies. The stock price has lagged the index of the financial industry.

In October, 2004, the president of the Dyninvest division, Elaine Rodriguez, submitted a proposal to the CIO of Dynamix, Geof Chang, for the urgent purchase of a vendor customer information management (CIM) system package from the vendor Seibel. The submission was part of the annual budgeting process which required all divisions to get their IT investments and operating costs reviewed and approved by Chang and his staff before they spent divisional funds or allocated corporate funds. The request for Seibel was the only new system request from the division for that annual cycle. It amounted to $1.75 million in purchase and implementation costs, all of which would come from the Dyninvest division's budget. Dynamix's IT budget was $425 million a year. Approximately 30% of that was from corporate funds, spent either centrally on company-wide infrastructure or allocated to divisions for applications which could benefit more than one division.

This morning your boss Dillon received an angry phone call from Rodriguez, who had just received an email from Chang. The email informed her that the request for the CIM package was being reviewed in light of a previous plan, approved by the corporate IT steering committee in June, 2004, for $10 million over 18 months, to consolidate customer information across most divisions, to move to a web-services architecture that would employ plug-and-play applications like "Salesforce.com", and that Seibel was not a preferred vendor. Rodriguez had told Dillon, "There is no way we can meet our sales targets in 2005 without the new system. We are being beaten by the competition in enlisting banks, financial advisors, and estate planners, our key channels to the consumer, in selling our mutual funds and index funds, and it is because we don't support our staff with information. Many competitors use Seibel, and we need it now." Dillon, as a member of the corporate IT steering committee along with other direct reports to the CEO of Dynamix, including CIO Chang, knew about the approved web services strategy but appreciated that Dyninvest was under pressure to increase sales.

As he gives you the assignment, Dillon says, "What should I do here? I know you are new to Dynamix, so if you have any other questions or a way to think about this, start with that. But you and I need to have an approach this afternoon. I'm meeting with Rodriguez and Chang at four pm."
AIRNow: Arming the Public with Air Quality Data

November 2003, revised March 2004

The amazing thing about this project is that state participation is voluntary and yet all of the states with an ozone problem have embraced it. I haven’t heard of many government programs that are voluntary and successful. The success of the program is a testament to Chet Wayland’s quiet but effective leadership.

- Phil Dickerson, EPA Environmental Engineer

In June 2003, Chet Wayland, manager of the EPA Office of Air Quality Planning and Standards AIRNow Program, reflected on the progress AIRNow had made. Since picking up the gauntlet in 1998, Wayland’s AIRNow project had grown to provide the public in 45 states and 276 metropolitan areas with up-to-the-minute ozone air quality data and one- to three-day forecasts. Although participation in the program was voluntary, air quality engineers across US state and county governments, national parks, and parts of Canada and Mexico pooled their data every hour to produce color-coded maps (see Exhibit 1). People with asthma or heart problems, young children, or those with regular exercise regimens could tell at a glance when to shift their activities indoors. Unlike the EPA’s official air quality statistics, AIRNow maps and forecasts were readily available on the web, The Weather Channel, and in USA Today.

Since 1976, the EPA had required states to report ozone levels quarterly. This data was carefully collected, stored in the EPA data center, and used mainly to evaluate whether states were in compliance with federally mandated air quality standards. Phil Dickerson, EPA Environmental engineer, noted that since the data was processed and stored in a mainframe environment, “It was difficult for the public to get ahold of the data – they had to do a Freedom of Information Act (FOIA) request. And the data that we sent to them was hard to interpret.” As a result, most citizens remained uninformed about ozone in their cities and neighborhoods, even when it reached potentially hazardous levels.

The AIRNow program completely changed the public’s ozone awareness. It brought air quality information out of the glass house and put it in citizens’

This case was prepared by Professor Donna Stoddard chair of Babson College’s Information Management Division and Dr. Jane Linder director of research at the Accenture Institute for High Performance Business, with the assistance of Steven Powers, research associate. Funding was provided by the National Science Foundation program for digital government.
According to Lewis Weinstock, an air quality forecaster for Forsyth County, North Carolina, the AIRNow initiative significantly changed his role. He noted, “I manage an air quality monitoring group for a local agency in Winston-Salem. We are an analysis and monitoring section. We measure pollutants for the Clean Air Act. To put our group into context, the EPA sets expectations for maintaining ozone standards, but most air quality monitoring work is delegated out to state and local agencies.” Weinstock continued,

We have a county of over 300,000 people, and North Carolina has a lot of air quality problems. Prior to AIRNow, we didn’t interact much with the public; we saw our role as taking numbers and reporting them to the state and federal government. As the Internet grew and people’s interest in air quality grew, everyone recognized there was much more immediacy to the data and value to the public. We used to tell them six months later what they shouldn’t have been doing on a particular day because of air quality conditions. Now we tell them three days ahead of time.

We now see our role as being proactive, warning citizens and working with the media to make sure information is distributed accurately and quickly. AIRNow has convinced most of the air quality people to
come out from behind their computers and be ready to be in front of a camera.

**Overview of Ozone and US Federal Regulations**

Ozone occurs naturally in the Earth’s upper atmosphere – 10 to 30 miles above the surface – where it forms a protective barrier that shields people from the sun’s harmful ultraviolet rays. The barrier is sometimes called the “ozone layer.”

Because of pollution, ozone can also be found in the Earth’s lower atmosphere, at ground level. Ground-level ozone is a major ingredient of smog, and when inhaled – even at very low levels – it can damage people’s lungs and cause a number of respiratory health effects. Ground-level ozone can also damage crops and many common man-made materials, such as rubber, plastic, and paint.

Ground-level ozone forms when various pollutants, such as volatile organic compounds and nitrogen oxides, mix in the air and react chemically in the presence of heat and sunlight. These pollutants are known as ozone precursors. Common sources of volatile organic compounds (often referred to as VOCs) include motor vehicles, gas stations, chemical plants and other industrial facilities. Solvents such as dry-cleaning fluid and chemicals used to clean industrial equipment are also sources of VOCs. Common sources of nitrogen oxides include motor vehicles, power plants and even wood-burning stoves.

Because ground-level ozone forms more readily in the hot, sunny conditions of summer, it tends to be a seasonal problem, approaching hazardous levels in the US between May and September. It also travels easily. A summer ozone plume generated from Boston automobile and industrial exhaust could be in Maine’s Acadia National Park in a matter of days.

Ground-level ozone is regulated under the Clean Air Act, the comprehensive federal law amended in 1990, that regulates air emissions in the United States. Among other things, the Clean Air Act requires the US EPA to set standards for “criteria pollutants” – six commonly occurring air pollutants, one of which is ground-level ozone. These standards, known as the National Ambient Air Quality Standards (NAAQS), are national targets for acceptable concentrations of each of the criteria pollutants (see Exhibit 2). For each pollutant, the EPA has developed two NAAQS standards:

- The “primary standard,” which is intended to protect public health.

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1 Information in this section was excerpted from *Ozone Monitoring, Mapping and Public Outreach*, EPA/625/R-99/007 September 1999.
The “secondary standard,” which is intended to prevent damage to the environment and property.

Exhibit 2: National Ambient Air Quality Standards

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>STANDARD VALUE *</th>
<th>STANDARD TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide (CO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-hour Average</td>
<td>9 ppm (10 mg/m³)</td>
<td>Primary</td>
</tr>
<tr>
<td>1-hour Average</td>
<td>35 ppm (40 mg/m³)</td>
<td>Primary</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>0.053 ppm (100 µg/m³)</td>
<td>Primary &amp; Secondary</td>
</tr>
<tr>
<td>Ozone (O₃)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-hour Average</td>
<td>0.12 ppm (235 µg/m³)</td>
<td>Primary &amp; Secondary</td>
</tr>
<tr>
<td>8-hour Average</td>
<td>0.08 ppm (157 µg/m³)</td>
<td>Primary &amp; Secondary</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quarterly Average</td>
<td>1.5 µg/m³</td>
<td>Primary &amp; Secondary</td>
</tr>
<tr>
<td>Particulate (PM 10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-hour Average</td>
<td>50 µg/m³</td>
<td>Primary &amp; Secondary</td>
</tr>
<tr>
<td>Particulate (PM 2.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-hour Average</td>
<td>15 µg/m³</td>
<td>Primary &amp; Secondary</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO₂)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>0.030 ppm (80 µg/m³)</td>
<td>Primary</td>
</tr>
<tr>
<td>24-hour Average</td>
<td>0.14 ppm (365 µg/m³)</td>
<td>Primary</td>
</tr>
<tr>
<td>3-hour Average</td>
<td>0.50 ppm (1300 µg/m³)</td>
<td>Secondary</td>
</tr>
</tbody>
</table>

* Parenthetical value is an approximately equivalent concentration.

Source: [www.epa.gov](http://www.epa.gov)

A geographic area that meets the primary health-based NAAQS is called an attainment area. Areas that do not meet the primary standard are called non-attainment areas.

The Clean Air Act requires each state to develop a “state implementation plan” (SIP), which describes the programs it will use to maintain good air quality in attainment areas and meet the NAAQS in non-attainment areas. For example, if
a city or region is a non-attainment area for ozone, the SIP describes the
programs that will be used to meet the primary NAAQS for ozone. For example,
to address ozone non-attainment, a state could install vapor recovery nozzles at
gasoline station pumps to reduce refueling emissions, adopt strict NOx emission
limits for power plants and industrial sources, limit solvent usage in factories, or
tighten vehicle inspection programs.

One of the elements of a State’s SIP is a network of monitors that measure
concentration of the six critical pollutants, including ozone. An ozone
monitoring network is an air quality surveillance system consisting of
monitoring stations that measure ambient concentrations of ozone hourly. The
Clean Air Act places the responsibility on states to establish and operate these
ozone monitoring networks and to report the data to the EPA. This schedule
gives state monitoring organizations the opportunity to review their data for
accuracy before reporting it. The EPA uses data from the air quality system
(AQS) to determine whether an area is complying with the standards, and if not,
what enforcement actions are required.

AIRNow Takes Shape
In 1994, progressive EPA environmental engineers in Maryland began a pilot
program to map their state ozone information. Hindered by poor computer
capabilities and access to only one state’s information, their early maps were
limited and received little exposure. The pilot fizzled, but the idea survived.

Encouraged by growing interest in the Internet, the EPA’s Region 1, Boston office
picked up the baton in 1996. Managers there reasoned they could pull data from
multiple states and make it available to the public on a website. Dave Conroy, a
manager in the Boston EPA air quality planning group, recalled, “At the time,
some states had toll-free numbers and sent some information to newspapers, but
we felt we were not really getting the message about pollution levels out to the
public. We pooled our money with Maryland through an association called
NESCAUM [New England States for Coordinated Air Use Management].
NESCAUM let a contract to have the hourly ozone data from 13 New England
and mid Atlantic states plus Washington, DC compiled into an animated map
and posted on our website.” Lee Alter, the project manager for NESCAUM who
had been involved from the project’s early days, continued, “We had collected
the data for 20 years, but no one ever looked at it. There was no easy way to
share; New York had to fax New Jersey to get its data. The regional EPA
leadership backed the mapping project in order to build awareness about ozone,
help people understand, for example, why vehicle inspections are important, and
improve public health.” By May 1997, the software was up and running. Conroy
summarized, “We achieved our objectives: we made the information available so
that interested people could seek it out.”
That first summer, EPA Region 1 posted ozone maps and forecasts three times a day on the web from information that the states contributed voluntarily. By the end of the 1997 ozone season, however, it was struggling to overcome the contentious organizational politics and technology hurdles it faced in its bid to extend its reach to additional states. Despite its initial success, one participant reckoned that the team did not have the resources to continue to support the process through the next year.

**EMPACT**

Helping hands reached out from an unexpected source. As yet unaware of the Boston project, Chet Wayland and Phil Dickerson in the EPA’s central planning organization were looking for a way to accomplish the same goal, but at a national level. They learned of a new Clinton administration initiative called EMPACT (Environmental Monitoring for Public Access and Community Tracking). According to Dickerson, EMPACT began as a campaign promise. He noted, “When Clinton stopped in Kalamazoo in his re-election campaign, he promised people easier access to environmental data. Early in his second administration, he created the EMPACT initiative.” EMPACT funded project proposals to bring people up-to-date, understandable information about local environmental conditions (see Exhibit 3).

### Exhibit 3: Key Events in U.S. Ozone Mapping

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>U.S. State of Maryland began Ozone mapping</td>
</tr>
<tr>
<td>1997</td>
<td>U.S. EPA Region 1 took responsibility for ozone mapping and expanded it to 13 New England and mid Atlantic states and Washington D.C.</td>
</tr>
<tr>
<td>1997</td>
<td>President Clinton announced the EMPACT program</td>
</tr>
<tr>
<td>1998</td>
<td>EPA headquarters took over the ozone mapping program and named its initiative AIRNow</td>
</tr>
<tr>
<td>2000</td>
<td>EPA firewall improvements made it difficult for states to upload their ozone data to EPA data center computers</td>
</tr>
<tr>
<td>2001</td>
<td>Sonoma Technology was awarded the contract to run the AIRNow data collection and reporting systems</td>
</tr>
</tbody>
</table>
Dickerson continued,

Chet and I wanted to bring data to the public in a format that they could understand and without having to do a mainframe printout. EMPACT came along and provided resources via grants. We wrote a grant request, and it was approved. Then we knew we had to produce something. We had to figure out how we would pull it off.

In the fall of 1997, Wayland and Dickerson looked around the country and discovered that EPA Region 1 in Boston had technology that allowed them to produce ozone maps. They went to meet with representatives of Region 1. Wayland recalled, “We thought, if we can get the money to build the infrastructure we can carry this concept to a national level.” They called their project AIRNow. Dickerson continued,

Everything clicked. It was just Chet and me. Chet was the marketing management person, and I was the tech guy. I saw technology that I knew we could use, and Chet saw a process we could bring down here and expand. Region 1 was starting to groan under the weight of what they were doing and were running out of resources. We said we’ll take the project, bring it to headquarters and try to expand it. Between that October and the following May, during the ozone ‘off-season,’ we moved everything and tried to get it running with EPA headquarters in charge of it. And we tried to bring in some of the other regions. We expanded it down to South Carolina and into the Midwest.

To satisfy the EMPACT objectives, the EPA needed hourly ozone data from the states. While states already had monitors in place to comply with AQS reporting requirements, these systems were not designed for consistent, high quality, hourly data transmission. For example, some needed additional monitors or data loggers, others required faster modems. Dickerson continued,

The AIRNow data comes directly from the monitors at least once per hour. The data which is submitted to AQS quarterly has been subject to extensive quality assurance. Technically, the AIRNow and AQS data shouldn’t be that different, but if a monitor is malfunctioning, AQS allows for correction.

“In the early days of the program,” noted Ron Stockett, air quality monitor for the Missouri Department of Natural Resources, “some were concerned about sending in unchecked data.” He continued,
But when it came to ozone, we had become very confident of our instruments. We insisted that they allow us to use two instruments at each site, just for quality control. If both instruments have the same data, then the numbers should be right. If one says 20 and the other says 80, you know something is wrong. That’s our major method of quality control. We have people checking the data four times per day, and if the monitors at a location are not in agreement, we won’t use the data from that location.

States’ concerns were also eased by the fact that both ozone levels and forecasts would be shown on maps as color bars rather than precise numbers. Wayland insisted from the beginning that states agree on a standard ozone color key so that, for example, a “red alert” ozone day would have the same meaning across the country (see Exhibit 4).

<table>
<thead>
<tr>
<th>Air Quality Index Levels of Health Concern</th>
<th>Numerical Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>0-50</td>
<td>Air quality is considered satisfactory, and air pollution poses little or no risk.</td>
</tr>
<tr>
<td>Moderate</td>
<td>51-100</td>
<td>Air quality is acceptable, however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.</td>
</tr>
<tr>
<td>Unhealthy for Sensitive Groups</td>
<td>101-150</td>
<td>Members of sensitive groups may experience health effects. The general public is not likely to be affected.</td>
</tr>
<tr>
<td>Unhealthy</td>
<td>151-200</td>
<td>Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.</td>
</tr>
<tr>
<td>Very Unhealthy</td>
<td>201-300</td>
<td>Health alert: everyone may experience more serious health effects.</td>
</tr>
<tr>
<td>Hazardous</td>
<td>&gt;300</td>
<td>Health warnings of emergency conditions: The entire population is more likely to be affected.</td>
</tr>
</tbody>
</table>

Source: www.epa.gov/airnow

Wayland and Dickerson used their EMPACT grant to offer seed money to states that wanted to join the initiative. This enabled states to purchase the new hardware and software they needed to upgrade their data collection infrastructure. In addition, Wayland got his own chain of command to certify that AIRNow data would never be used to evaluate a state’s compliance with ozone regulations. According to Stockett, “The EPA
funding was critical to the success of this project. States were willing to provide horsepower, but didn’t have the budget to provide hardware and software.”

**Picking up Steam**

At the close of the 1998 ozone season, Wayland and Dickerson decided to move AIRNow’s central data collection activity to the EPA’s national data center in Research Triangle Park, North Carolina. They asked the EPA’s IT outsourcing provider to supply post-processing, infrastructure, and an Internet web site. They worked through the government’s meticulous procedures for implementing a new application and went live in April 1999. Dickerson recalls, “This was groundbreaking for the people in the computer center. They had never supported a public-access web application or had the requirement to collect and process data hourly. It was all brand new to them. And in the middle of the transition, key technology people in Boston were moving on. We had to scramble.”

With central processing under control, the AIRNow program directors were able to increase the frequency of ozone maps to seven times a day. They also brought additional states on board. People like Mike Koerber, executive director of the Lake Michigan Air Directors’ Consortium, were invited to meetings Wayland convened to discuss how to expand the program. Koerber remembered:

Each state had its own computer systems and databases, and we never had any luck trying to transfer mapping technology from one state to another. But all of our states were thinking about ozone action programs and how to make the data available. With AIRNow, the EPA was offering to provide a consistent system and make it as easy as possible to tie in. It was obvious to everyone that this was a good thing.

Forsyth County, North Carolina’s Weinstock continued, “Being a small agency, we like innovation. When Chet called and asked us to participate in the forecasting program, he didn’t have to twist my arm. North Carolina is one of the top ten states for air quality problems, so everyone realized this was a smart thing to do.”

In an effort to expand the program, Wayland launched an annual AIRNow conference for all the initiative’s participants and prospects. One environmental engineer recalled, “Chet would start by saying it was our program. He would have speakers talk about what they had accomplished, and then he would get up and ask us what we needed to take our programs to the next step.”
Under Wayland’s supportive leadership, more states and cities volunteered to participate. Sacramento, Los Angeles, San Diego, San Francisco and the central California valley had been working with Sonoma Technology, a local contractor, for several years to map their own region. Wayland signed Sonoma up as the west coast mapping center. Subsequently, Washington State, Arizona and Texas joined the initiative. By early 2000, 35 states and 100 cities were transmitting hourly ozone levels to the EPA.

As the AIRNow program expanded, it hit some technology bumps. For example, an early 2000 GAO audit of the EPA’s security found serious issues. It threatened to shut down the EPA’s connection to the Internet unless the agency implemented a strict firewall. On February 17, 2000, the firewall went up, and AIRNow went down. Dickerson recalls, “We came back from a conference and found that we were no longer connected to the Internet. There was no warning or lead time. It was a complete blow.”

Over the next eight weeks, the AIRNow team reconfigured the data collection process so that states could drop off their ozone information to mirrored servers outside the firewall. The files would be picked up, encrypted and brought inside the firewall. The team was less than thrilled with the 15-minute processing delay this introduced into their hourly cycle, but they were back in operation before the 2000 ozone season opened.

**AIRNow Airs**

As luck would have it, USA Today was redesigning its weather page in the spring of 2000. Lynne Perri, deputy managing editor, went looking for something that would make her paper distinctive. She explained, “We needed something that our readers couldn’t get from either TV or from a big city newspaper. We started talking to people, and the folks at the American Lung Association led us to Chet. There were some issues to iron out, but in the end, we decided to see if we could pull off daily air quality forecasting.” AIRNow’s data did not match Perri’s needs exactly. She wanted daily information for 36 key cities in the US. AIRNow carried information on more than 100 cities, but some on Perri’s list like Nashville and New Orleans were missing. For those cities, Perri’s paper ran “N/A” while the AIRNow team tried to pull their environmental monitoring organizations into the community. Wayland also opened up conversations with CNN and The Weather Channel.

To address lingering technology glitches, Wayland hired a new program manager, John White. When White arrived, he found FORTRAN programs, flat text files and no data archives. Because of the increased media exposure and need for overall data management, the team decided to upgrade AIRNow to an Oracle database system to increase reliability and to improve the team’s ability to
produce new products with the data. Despite EPA’s bias toward keeping systems work in-house, the team decided to work with an outside contractor. White enumerated the reasons:

First, the contractors who run the in-house systems understand computers, but not weather or air quality. We wanted more scientific people who could help us actually understand the data and propose new ways to present the information. Second, an outside contractor turned out to be cheaper. Third, we could speed up our data turnaround process if we got outside the EPA firewall.

Sonoma Technology won the contract to develop the new MapCon software in early 2001 and when it delivered at the end of the year, earned a three-year contract to run the system. Tim Dye, vice president of meteorological programs and public outreach for Sonoma, summarized:

We bring two critical things to AIRNow. We are meteorologists, not computer technicians. So we know right away when the data do not look right. Secondly, we recognize the importance of reliability when we’re feeding data to media outlets like The Weather Channel. We have an Oracle database running on redundant servers and hard drives. We have automated as much of the processing as possible to provide speedier, reliable service.

Dye asserted that strong communication and good coordination was at the crux of the program. He continued:

AIRNow doesn’t exist without the stakeholders. They are key to its survival. The program needs to figure out how best to serve the stakeholders so they are overwhelmingly compelled to participate. How do we do it? We monitor things closely, and we have a few folks who are really good at communicating. For example, last week one of our meteorologists saw a strange reading from one of the monitors and sent out an email. The stakeholder with the problem wasn’t talking to a technician; he was talking to a colleague. We speak their language.

Once processing moved to Sonoma, new products and features were added regularly. For example, the program went to hourly updates of maps from a schedule of seven times a day (Exhibit 5 shows a technical schematic). The media were receiving their data feeds like clockwork. By this time, a total of 45 states and more than 100 agencies were contributing their data. This included Georgia, a late-comer among southeastern states, which had gotten tired of explaining why it was grayed out on all the air quality maps. Sonoma’s Dye noted,
“AIRNow has so much momentum that people now participate because their data and information really go places and are being used by the public. AIRNow is providing ozone maps and air quality forecasts that go to The Weather Channel, USA Today, and local TV. This year they’re updated at 30 minutes past the hour rather than at 45 minutes past the hour as was done last year. So we’re closer to real-time.”

By 2003, EPA had developed a feature entitled “Where I Live” on www.epa.gov to provide tailored information to individuals. They also implemented AIRNow Tech, a private website for the stakeholders. This portal gave environmental agencies complete access to the ozone database and the ability to conduct their own analyses.

Making a Difference
It was hard to pinpoint health or environmental benefits that could be attributed directly and exclusively to AIRNow, although all would agree that it had made an impact. According to Boston’s Conroy, “We started a service in the region called Smog Alert Service, where people sign up on a list to receive notice by email or fax when states are forecasting unhealthy air. There are about 2000
organizations on our list -- nurses, day camps, nursery schools. While we cannot quantify how this data helps the public, sometimes we get replies like "Thanks for the service. It helps with an asthmatic child." Another air quality forecaster noted that a football coach in California routinely cancelled practices when bad ozone days were forecast. Wayland added:

We get tons of email from the public. Someone who runs a daycare center can send the kids outside in the morning if air quality is forecast to be bad in the afternoon. Some proactive cities like Washington DC make the busses free on ozone action days. We have cases in Baltimore where companies voluntarily shut down certain manufacturing processes on a bad day. UCLA did a study that showed hospital admissions for children with respiratory problems declined four to seven percent on days when air quality forecasts were for unhealthy levels. People with asthma and heart problems know to stay indoors and rest so they won’t end up in the emergency room.

Susannah Fuchs, senior program and air quality director of the American Lung Association of Eastern Missouri, noted that companies often take steps to reduce pollution during ozone season, especially if a bad air day is forecast. She pointed out, “A company’s transportation coordinator might coordinate carpools or even provide bus passes.” Some firms voluntarily changed their work hours to avoid adding to rush hour ozone levels. Others delayed using gasoline powered lawn mowers until air quality improved. Supporters hoped that these voluntary measures would add up to enough air quality improvement that the state would ultimately avoid EPA sanctions. One state official remarked, “We’d rather not have the EPA enforcers watching over our shoulders.”

Forsyth County’s Weinstock added, “I can’t document that I have saved anyone’s life, but people appreciate the product and tell us so. And the alerts in North Carolina have gotten state legislators to pay more attention to power plants and cars. Legislators who never would have voted for increased air quality regulation will do it now because of the code orange and red alerts.” He continued, “Chet’s group deserves the credit for demonstrating why this is important. They don’t like to take credit for themselves, but they shield people from red tape and encourage collaboration. People love to work with them, and that’s not typical of the local-state-EPA relationship. Chet has often asked us to present at his conferences, and he helped us win an EPA national award. We don’t have to do this, but it’s fun and innovative and our boss loves it.”

Dye went further, “This program has something for everyone. Getting meaningful air quality information out there helps people to take action to improve their own health. In addition, this program enhances the capabilities of
the air quality agencies that participate. They’re providing a clear public service, and when they see their work on TV, it makes that agency stand out. For myself, I’m a scientist. I used to be content to sit at my computer and do my research. With AIRNow, for the first time, I’m doing something that really makes a difference for people. It changed my life.”

**Facing the Future**

According to LADCO’s Koerber, AIRNow’s success created high expectations for air quality efforts in general. He remarked, “Public awareness is high. Policy makers, the media and the public want to know, if we can do ozone, why we can’t we do particles and other pollutants? These are very challenging.”

Wayland and the AIRNow team pushed ahead. By October 1, 2003 they began to report and forecast air quality year round. However, monitoring and forecasting particulate matter (PM$_{2.5}$), the winter pollutant, involved a great deal more effort. It required a different monitor – a filter-based system which collected a sample that was sent to a laboratory for analysis. While 1300 ozone monitors were operating in the US, only 280 PM$_{2.5}$ monitors were in place. In addition, many agencies were not staffed for year-round forecasting. Their professionals used the ozone off-season to take care of other responsibilities. Finally, EMPACT funding had run out in 2001, so the team had to rely on states and cities to fund their own operations.

USA Today’s Perri encouraged, “Our readers love the ozone air quality data that we publish. Baby boomers grew up with enhanced weather coverage and want more and more sophisticated information. We will be covering the Olympics in Greece in 2004 and are already talking about how air quality in Greece can affect athletes and tourists.”

Dickerson was undaunted by the challenges ahead. He explained, “People tell you to plan things in advance. But with AIRNow, if we had planned up front, I’m not sure we would have done as well. We would have come up with a different answer. As it was, we just had a spark that turned into a bigger and bigger fire.” Wayland continued, “Five years ago, colleagues within the EPA felt that the AIRNow program would never work and believed it would be difficult to find the requisite state resources to fund the program. Today, given the public’s demand for information about air quality, it would be difficult, maybe impossible, to stop the program.”
Lifeline Systems, Inc. — The CareSystem Project

In November 1998, Ron Feinstein and Rich Reich, CEO and VP of Technology and Advanced Services of Lifeline Systems, Inc., were reviewing the status of the CareSystem project. The project, currently estimated at $12 million (greater than 15% of Lifeline’s annual revenues) would be a totally new information technology platform for running the telephone response center. Indeed, CareSystem was known among senior managers to be a “bet the company” project. Ron and Rich knew that a smooth migration to the new platform, scheduled to begin December 1, was essential. Delay could be costly and a lost phone call from a subscriber could mean a loss of life.

The CareSystem project was running eight months late and some 100% over budget compared to original estimates in 1996. Nevertheless, Ron, Rich and the rest of Lifeline’s 7-person senior management team, which had been closely involved in all phases of the project, felt in retrospect that project problems had been well handled.

In mid-October Lifeline had announced an agreement to be acquired by Protection One, a security monitoring firm, subject to approval by shareholders of both companies. While Ron and Rich anticipated that Lifeline would continue quite autonomously after the acquisition, they were anxious that the new owners begin to see the benefits in cost reduction and expanded revenues as soon as possible. As in other respects, the new technology of the CareSystem project was key to such future benefits.

As they reviewed the status of the CareSystem project, Ron and Rich wanted to be sure they had not missed any areas of risk as the “go live” date approached.

The Business

Lifeline Systems was the market share leader in the “personal response industry,” providing telephone answering service in response to elderly individuals who called from their homes. A call was typically initiated by the caller pressing a button on a pendant or wristband. This in turn activated the communicator box like a remote cordless phone. The call was answered and handled by a trained monitor from the call center in Lifeline’s Cambridge or Toronto location. Each monitor, with a hands-free headset, sat at a computer terminal on which the essential information on the subscriber appeared as the call was answered. (For more information on the service, see www.lifelinesys.com.)

Lifeline manufactured the pendants and communicator sets and sold or leased them to health care providers throughout the US and Canada. A physician might recommend to a patient, particularly one living alone and with a condition not serious enough for full-time institutional care, the use of the Lifeline service. The local hospital would then install the equipment in the subscriber’s home and show how to operate it. The hospital could provide the answering service themselves, or contract to pay Lifeline a monthly fee to answer calls on the provider’s behalf from Lifeline’s response centers.

This case was prepared by Cyrus F. Gibson at the Sloan School of Management, Massachusetts Institute of Technology. The author would like to thank the many Lifeline Systems employees who contributed to making the case possible.

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10/18/99
From Product to Service

Lifeline was founded in 1974 by the inventor of the personal help button and communicator box devices. Initially the focus was on manufacturing and selling the product, through channels directly to the consumer. In 1978 A. Dennis Shapiro joined as Chairman and CEO. Significant new financing from private sources was achieved for product development. Marketing was refocused on hospitals and doctors. The response center service was established as a source of sustained revenue.

In the 1980’s a new CEO was named, with Shapiro remaining as Chairman. Perceiving that the traditional channel through hospitals was maturing, the company sought to stimulate that market and also to broaden to other markets for its personal communicator products. Price reductions to hospitals led to a spurt of increased sales, with record revenue of $32 million in 1991, growth in profit of 600%, and a near quadrupling of stock price. The emergency response equipment was redesigned and offered through new channels, such as telephone stores, for other consumer uses. In addition to these moves the company worked to increase the proportion of its subscribers who used its central response center.

However, difficulties with the expansion strategy quickly emerged. The devices through retail were priced at $300, while hospitals paid over $500 per unit for essentially the same technology, both plus a monthly fee for the monitoring service. Many hospitals, the traditional channel and partner in service, were alienated. Independently, Lifeline’s revenues fell and a first quarter loss was reported in 1992.

Ron Feinstein, brought to the Lifeline Board by Chairman Dennis Shapiro in the early 1980’s, became CEO in 1992. The company shifted away from the product diversification policy and refocused on the needs of the subscriber and the provider channel. Revenues and profits recovered, with steady growth continuing through the third quarter of 1998. (See selected financial statements, Exhibits 1 and 2.)

Current Operations

In 1998 the company growth and success continued to depend on products and services essentially unchanged for ten years. The proportion of revenue from service revenue (call monitoring and outsourcing of provider business such as accounting and billing to subscribers) had grown from 33% in 1993 to 60%. Over 2000 hospitals and other healthcare providers offered Lifeline services. Cost for installation was $50 to $100, and monthly fees for subscribers averaged $32 per month. Total subscribers to Lifeline stood at over 350,000, some 230,000 of whom were served centrally by the company. Annual revenues from these monitoring services were running at approximately $40 million, and increasing at an annual rate of 25%, compared to product revenues, at $24 million and declining at 6% a year. It was estimated that in order to grow the number of centrally-monitored subscribers by 20% per year it would be necessary to add some 12,000 subscribers to the central database per month. This would be to replace those lost (22% to nursing homes, 17% deceased, and other less significant causes), and could come from new subscribers or from conversions from the provider monitored segment.
Monitors in the response center answered up to 18,000 calls in a 24-hour period, each call lasting from a few seconds to several minutes. The 230 monitors operated in three shifts continuously. Each shift was further subdivided into “self directed teams” of five to eight individuals, who sat near each other and offered assistance to and took calls for team colleagues as needed. Each shift also had at least two “coaches” and one “manager” in charge of the shift, all of whom were themselves experienced monitors. Coach and manager positions were only filled from within. Pay for monitors and coaches ranged from $9.75 to $14.00 per hour. Managers and the head of the response center were salaried, with an average gross pay of $45,000 plus benefits. Benefits for all employees ran about 15% of base pay.

Managers conducted performance appraisal of monitors once every six months. Monitors were eligible for a merit pay increase once a year. A key basis for performance appraisal was the use of recordings of a monitor’s calls, with explicit comparison made to his/her team peers. Evaluation was based on how quickly and how effectively monitors handled calls. Coaches also conducted feedback discussions with monitors using the recordings, but not as direct input to pay increase decisions. One manager described an important factor influencing monitor performance, including quality of responsiveness and efficiency of handling calls, as the peer pressure from team members. Turnover of monitors was not significant, and in 1998 new hiring was going on at the rate of four per month.

**Strategic Opportunities and Direction**

Ron Feinstein and his senior management colleagues believed Lifeline was well positioned to grow and thrive in the evolving market for elderly and homebound servicing. They pointed to the projections of the growing population of the elderly, due both to the aging of the baby-boom generation and the increase in life expectancy. In addition, the achievement of a balanced Federal budget in 1997 had meant cutbacks in home health care funding, which in turn drove medical providers (Lifeline’s “customers,” who were key to recommending the emergency call service to their patients) to look for less expensive ways of caring for patients.

Lifeline held some 70% of the market for emergency response. Several senior managers believed their competitive position was strong, given their relationships with the providers as a sales channel and the effectiveness of their response center operations. One commented, “The only sizable potential competitor would be one of the big home and office security firms, but their style and culture are different. They protect things; we protect people. Getting into our kind of services would be a big change for them.”

In reviewing its history, Ron saw Lifeline entering a third phase of its business cycles, changing its nature but still within its founding vision:

> I want this to be a company that sustains itself and gets stronger over time. We went from dependence on a maturing product to services, and now we are poised to be a business based on information exchange and information as a resource. Through these changes in the business we remain focused on our mission, to enable the elderly to live independently in their homes. We are positioned to take advantage of changes in demographics and
health care economics. The market for services to the elderly is just beginning to open up. We have and should be able to sustain our competitive lead. This business is a wonderful opportunity to help people, do some good, and get paid doing it!

Ron described the three strategic phases in Lifeline’s history graphically as three life-cycle curves (see Exhibit 3.)

**Staff and Management**

Lifeline prided itself on providing an important personal service to its subscribers. Training and protocols for call center monitors reflected the importance of patience, courtesy and understanding in dialogue with callers. At the same time, diligence and accuracy in following up a call were vital, including providing information to responders (those in a subscriber’s data file who were to be notified, such as relatives), notifying emergency services (such as the local ambulance service), and providing fax reports to the provider or physician upon closure of the case.

A recruiting video illustrated that monitors were themselves gratified and pleased with the service they provided. Many monitors first heard about Lifeline through friends who worked there. Several managers noted that they had elderly parents or relatives who were themselves subscribers to Lifeline. Less than 5% of calls were true emergencies, but monitors were encouraged to treat any call as an opportunity to provide support and reassurance to a subscriber. In times of need in the call center, employees from other parts of the company would leave their regular work and come to the center to help out.

Tom Loper, Vice President of Customer Care, described his role since joining Lifeline in 1995 as building the culture. With a PhD in organizational psychology and years of experience in human resources, sales and marketing, and as president of a firm, Loper had known and worked with Ron Feinstein over a period of years before being asked by Ron to come to Lifeline. Loper had overseen the development of systems and procedures for employee selection and training, for coaching and evaluation and rewards, and for communications and involvement. He and his colleagues believed they had succeeded in fostering a caring and committed workforce which was also diligent and highly effective in customer and subscriber relations.

Ron Feinstein conducted monthly informal sessions with employees, typically attended by twenty or more, in which virtually all aspects of the business were discussed.

The senior management group was composed of seven individuals, all but two of whom had been recruited by Feinstein when he became CEO in 1992. Feinstein had known and worked with most of these in a series of management positions at Dennison Manufacturing Company and elsewhere. The senior managers met monthly to discuss business, and also constituted most of the IT Steering Committee and key roles in the CareSystem team. Only one senior manager had left Lifeline during Feinstein’s tenure as CEO.
The CareSystem Project

In 1996 the company began investigations that led to the CareSystem project to replace both the infrastructure and the applications for the telephony-computer based central monitoring services. At that time the existing, home-grown system, known as CORMIS, was ten years old, had been designed for 7000 calls per day (in 1998 calls were running up to 16,000 per day, and on-line phone time was growing at 30% per year), and was on a DEC-VAX based platform. CORMIS was built around a Cullinet (subsequently Computer Associates) database product. The database product, being of mid-1980’s technology, had become obsolete with no easy upgrade path, restricting options for significant upgrade or enhancement. Computer Associates no longer provided effective support, and it had become virtually impossible to find support staff with any expertise (or interest) in the technology. The database and system architecture would limit future scalability and could not demonstrate the levels of fault tolerance that the rapidly expanding business required.

Rich Reich commented:

Our management team investigations led us to consider the significant advancement made in database technology since the original product that CORMIS used was developed, and to consider the rapid evolution of client server technologies. We fairly quickly determined that it should be a priority to develop an entirely new generation of call center service delivery platform that had the ability to support future growth and be flexible in meeting evolving business needs.

In addition, there was an incompatible parallel call system. In 1996 Lifeline had acquired CommuniCall, a firm which offered a social service of talking to subscribers, typically the elderly, for unlimited periods of time. It was infeasible to integrate the CommuniCall system with CORMIS. This resulted in two separate call center operations, with two separate desktop screens and two separate groups of monitors on each shift, and two separate billing and reporting systems. It was thus impossible to efficiently balance the assignment calls to available monitors.

Business Goals for CareSystem

Lifeline’s senior management team set four business goals for the CareSystem project:

1. Reduce the risk of a lost call or break in communications with a subscriber during an emergency.

   The system was designed to support this through increased capacity and fault-tolerant hardware and software. Moreover, the applications software at the desktop was to be “closed loop” in that it would be impossible for a monitor to let a call go unfulfilled without a warning notification. The system would be Y2K compliant, which could not be assured with the CORMIS platform

2. Improve efficiency and cost competitiveness.

   When properly used by monitors, the system would enable more efficient and effective handling of calls, such as due to the capability of the monitor making more than one call
without hanging up on the subscriber. “System-enforced protocols” would result in service that was more consistent, more efficient, and of higher quality. The new system enabled “skills-based routing” by which a call from a subscriber with special needs (e.g., Spanish language, or diabetes patient who might require medical advice) was directed by the system to a monitor on duty with those skills, saving much time once the call was answered. The system would allocate calls to monitors, rather than depend on the current method of a monitor taking calls from the top of the list as he or she chose, thereby improving work distribution or “balancing.” Statistics would be collected individual monitor’s use, including not only total time on a call but also how effectively the features of the system were utilized. These statistics could be used in individual performance appraisal, or even for monitoring the monitors on a regular or real-time basis, enabling improved feedback to the monitors.

The new system was a necessary first step toward the move to new headquarters in Framingham, where the rental cost savings over Cambridge was expected to pay for half the amortized cost of the entire CareSystem project over ten years. And finally, the flexible and scalable new system would enable extending to multi-site centers in lower labor cost locations in the state or the country with no loss of reliability.

3. Support and enhance revenue and subscriber growth for the future.

The scalability feature of the system would enable expanded memory and database capacity as well as growth of needed monitoring desktops. The open-systems architecture would allow new and as yet unknown software to be plugged in to provide for platform enhancement.

New services to the existing customer base were quickly envisioned, including such things as proactive calling to subscribers to remind them of medication or just to provide support.

4. Develop a foundation for the future around a central relational database.

While CORMIS had a central database of essential information for subscribers, it was structured to support a single service, and had limitations on how it could be modified and expanded. Before the new CareSystem database was defined, a significant effort was made by senior management to envision how the business could evolve and change in the future. While the specifics of future business offerings could not be articulated at this time, the new data model would be designed to accommodate the evolution of the business toward the vision. CareSystem would allow for a central database that could include and relate better information on subscribers, providers, referral sources, multiple services, and equipment.1

It was expected that integrated data and information could be invaluable not only the current customers and subscribers, but ultimately for new markets. While managers were reluctant to describe what some of these were, one said, “Just imagine how valuable it would be if we

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1 The importance of central, shared data had not always been recognized at Lifeline. In 1995, several IT applications projects were contemplate or underway which would have served separate functional needs with separate systems. These included systems for manufacturing, for customer (health care provider) business operations and outsourcing, and for sales support, and even a separated system to replace CORMIS. As one manager put it, “We were at risk of losing what we now see as the crown jewels of our business.” After considerable discussion and debate, it was decided to work toward a common database for subscribers and customers.
could monitor our subscribers’ vital signs in some way, and forewarn their doctors of an impending crisis. Or think of the value to the subscriber and interest to a local service to be able to help them with grocery orders or meals-on-wheels. The opportunities are huge.”

**Project Initiation**

In 1996, having decided an entirely new system would be necessary, the management team next considered building their own new software vs. buying and integrating packages. This choice was made problematical by the fact that although there were many “computer-telephony integration” (CTI) packages on the market, most of them were for conventional uses like inbound customer-initiated inquiries or outbound telemarketing. In these uses initiation of the communication was predominately one-way and typically did not require a sequence of related phone calls. Lifeline’s requirements included, for example, that a subscriber calling with emergency needs be kept on the line while one or more other calls were made on his or her behalf.

Early inquiries into package makers nevertheless led Lifeline managers to believe that modifications of currently available CTI and other software packages and their integration into a new system essentially customized to Lifeline’s requirements was the best approach. They also decided to choose a systems integrator consultant. In October 1996, after a four-month proposal review and screening process, Cambridge Technology Partners (CTP) was chosen as the lead consultant. The choice included not only criteria of technical competence and experience with similar projects, but a judgement that there could be compatible working relationships and the opportunity for Lifeline technical staff to be integral to the project team.

From the earliest days of the project, Ron Feinstein and Rich Reich kept the Board of Directors informed and sought their advice. All recognized that if the upgrade effort failed, “we are out of business.” One key member of the Board, with years of experience in the information technology industry, became an important supporter of the project and helped explain to and influence the views of other board members.

An overall schematic of the CareSystem architecture, from a company brochure, is shown in Exhibit 4.

**Phase I – Scoping and Package Evaluation**

The project began with an eight-week phase to establish requirements and scope of release one of the new system. Fifteen Lifeline staff and six CTP staff were full-time, plus technical experts and technology architects from CTP as needed. The lifeline core team included Rich Reich and Tom Loper, VP of Customer Care, plus managers representing all the business areas of the company. Win Shute, Director of IT who reported to Rich Reich, was also full time, as was the Lifeline project manager, Christine McFarland. A key ingredient of this phase, according to McFarland, was to ensure that software would be “component-based,” namely would be installable and removable on a more or less plug-compatible basis. Moreover, the role of Reich and Loper was “to keep us thinking strategically and long-term” in setting requirements and evaluating software vendors.
An early activity of this phase was the senior managers’ articulation of their view of current business needs, their vision of the future business needs, and their approach to an evolutionary path to the future. They worked at this intensively until they felt they were in alignment. This articulated vision became the basis for the interdisciplinary project team to define the scope and capabilities of the new system.

At about the same time, a user team of seven individuals was created. Five of these were monitors and coaches from the call center, one was from customer assistance (the group that dealt with the providers), and one from business management services, which dealt with such businesses as outsourcing to providers. The team of seven developed an extensive list of specific requirements for the proposed object-oriented, mouse-driven desktop. Their input was key to the design phase. The user team also became the trainers for CareSystem later in the project.

**Phase II – Proof of Concept**

At Lifeline’s initiation, this phase was introduced into CTP’s normal methodology. Partly as a result of the broad criteria and strategic discussions in the first phase, it was decided to build a prototype of the desktop screens for the call center monitors. This phase lasted six weeks. In retrospect, Lifeline managers saw it as an extremely important step in that concrete visible “screen pops” were generated and discussion of design, the next phase, was more concrete.

**Phase III – Design**

A result of the interest and insight of the previous phase was that more areas of complexity for desktop functionality were uncovered and carried into the design phase. In addition, because the platform was essentially being built for future enhancements and applications not yet known or imagined, there was a constant tension between growing the system and keeping it limited. Even the concept of scalable, plug-compatible modules for infrastructure and applications did not entirely ease this tension and the potential for deliberations to go on endlessly. Moreover, the team discovered during this phase that integration of vendor software packages was more complex than either Lifeline or CTP had anticipated. Good new ideas for functionality or modularity at the application level raised intricate specific problems of software integration. Each of these had to be documented.

The design phase began in early February, 1997, and ran six weeks later than scheduled, ending in mid-June. While Rich Reich and Ron Feinstein and other senior managers were wary of the consulting “burn rate” for every day beyond original plan, a rate of approximately $20,000 per week, they and the team felt the discussions and reasons for delay were important.

Looking back on the early phases in October, 1998, project manager Christine McFarland said:

> In my 12 years of project work in several companies and as a consultant I have never seen such dedication and involvement of the right people on a project. Managers with tenure and long experience in the running of the business were dedicated, full time, to the project scoping and design. Ron Feinstein met with us regularly and showed he knew what was going on. We all knew the importance, the risk, and the value of the project to the company’s future. No one was afraid to raise constraints or suggest new ideas. It was textbook and successful in that respect.
In retrospect we may have bent over backward a little too much in being open to all inputs. Every new idea, good or bad, had to meet the test of what it would take to build into the system which we all knew had to be totally reliable and redundant.

We might have saved some time by being more forceful about what was really feasible for the project. But it’s hard to see how the outcome at this point could have been better, particularly the commitment everyone around here feels now to a successful full implementation.

The design phase produced a two-volume set of system specifications.

**Phase IV – Development**

A full production environment was established at Lifeline for development, a “model office” next to the call center. Three releases were planned:


2. Added functionality to screens, conversion of data from CORMIS for further development and testing. —Completed in late October 1997.


It was not until this third subphase that relatively serious problems arose. Bugs were discovered in the package software of one of the vendors. The issues escalated when the vendor was unable to respond or resolve the issues quickly. Ron Feinstein and a senior CTP officer visited the CEO of the firm in California. This resulted in a more efficient relationship, with the firms’ software engineers coming on site to Cambridge to make the fixes. As this was nearing resolution, technical problems were found with a second vendor’s package. This time escalation to the top and the vendor’s responsiveness happened more quickly.

Rich Reich commented on the experience:

I don’t know how we could have known at the outset what we know now.

There is a rapid velocity of development and change in leading software products. Young companies are experiencing meteoric growth and are frequently unable to keep up with the development of an internal infrastructure that assures quality and proper customer service. Vendor assurances of their package’s reliability, and the fact that they are installed and running in call centers of their clients, were reassuring to us. Experience has now shown us that leading complex and flexible third party software can become very problematic when configured to meet the needs of a demanding non-mainstream business application. The applications exhibited significant bugs, and did not always perform as documented. It became apparent that their tremendous flexibility became their greatest weakness – not all configurations had been adequately tested by the vendor.

An additional difficulty in evaluating and applying new product categories is the lack of experienced development resources who would have some depth of understanding of the idiosyncrasies and limitations of new major products.
The issue for us, and for firms like us, is how to deal with these incredibly fast growing, dynamic vendors when we are as small as they are.

The net result of the delays was that final testing and the final release was not complete until mid-November. Nevertheless, the testing resulting in no serious problems, and it was felt that the cutover to live use, scheduled to begin with 5,000 subscribers on December first, was quite feasible.

Formal training of the monitors began in mid November, and was conducted by the seven members of the “user team” that had been involved in requirements setting from early in the project. The user team had also developed a new manual, called the “protocol book” which described in detail how the new system was to be used for all features. To enable training to take place, individual monitors at a time were taken from their normal job desk to the model office. To replace them, Lifeline had hired twenty additional monitors in October, spread over the three shifts. Training would extend well into 1999. It was estimated that the cost of training and implementation on the user side was some $750,000.

The full implementation of CareSystem was now estimated to be the end of June, 1999. This would make the project a full year later than originally intended.

Tom Loper had this to say about the delay and about the project in general:

We all recognize the complexity and difficulty of the project. No one is really surprised at the delay; it isn’t unusual and it certainly isn’t the result of resistance to change or implementation. The monitors are motivated by a diligent handling of a subscriber, as well as by their concern for that subscriber’s well being. We have designed the system and our use of it so that it provides the monitors with data which they can use for feedback on their performance. The user team represented a bottom-up factor in design.

While I think we have a deep store of support, we really must adhere to the schedule from here on to keep the confidence of the company. Monitors are upbeat about using the new system. The salesforce is eager to begin offering new services.

I’ve been involved in four major systems implementations in my career. This is one that has really been done right.

Looking Ahead

As Ron Feinstein and Rich Reich reflected on the history and importance of the CareSystem project they were comfortable with what they knew of potential issues and problems around the implementation itself. It appeared the plan for the transition allowed for backing out if unexpected problems occurred. They felt they had sought out and learned about all their vendors could tell them about the technical and user-change issues in such implementations, and that the involvement and change management within Lifeline was adopted to their unique culture. Nevertheless, they were anxious not to assume they knew it all, and wanted to make sure the rest of the management team had the same attitude.
While neither of the two had any intention of diverting attention from the transition over the next few months, both men were eager to see the benefits of the new services which could be offered, and to using the new infrastructure as a strategic resource for the future “information exchange” company. They felt the coming phase of the company’s business evolution, now to be within the structure of a parent company, would enable it to further fulfill providing a vita personal and health care services while making money.
**Exhibit 1: Lifeline Systems, Inc.—Consolidated Statements of Income (Dollars in thousands)**

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<td>1,709</td>
<td>1,066</td>
</tr>
<tr>
<td>Restructuring charge</td>
<td>—</td>
<td>—</td>
<td>2,280</td>
<td>—</td>
<td>—</td>
<td>4,310</td>
<td>—</td>
</tr>
<tr>
<td>Total costs and expenses</td>
<td>20,604</td>
<td>27,619</td>
<td>33,039</td>
<td>38,614</td>
<td>43,928</td>
<td>53,637</td>
<td>40,697</td>
</tr>
<tr>
<td>Income from operations</td>
<td>425</td>
<td>4,477</td>
<td>(4,543)</td>
<td>4,785</td>
<td>6,295</td>
<td>3,327</td>
<td>6,558</td>
</tr>
<tr>
<td>Total other income, net</td>
<td>132</td>
<td>306</td>
<td>89</td>
<td>740</td>
<td>783</td>
<td>594</td>
<td>298</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>557</td>
<td>4,783</td>
<td>(4,660)</td>
<td>5,505</td>
<td>7,078</td>
<td>3,921</td>
<td>6,856</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>222</td>
<td>1,991</td>
<td>(1,516)</td>
<td>2,357</td>
<td>2,902</td>
<td>1,623</td>
<td>2,755</td>
</tr>
<tr>
<td>Net income</td>
<td>$335</td>
<td>$2,792</td>
<td>($2,944)</td>
<td>$3,148</td>
<td>$4,176</td>
<td>$2,298</td>
<td>$4,101</td>
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<tr>
<td>Earnings (loss) per share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>$0.10</td>
<td>$0.77</td>
<td>($0.54)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>$0.71</td>
</tr>
<tr>
<td>Diluted</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>$0.51</td>
<td>$0.67</td>
<td>$0.37</td>
<td>$0.66</td>
</tr>
</tbody>
</table>
### Exhibit 2: Lifeline Systems, Inc. – Consolidated Balance Sheets (*dollars in thousands*)

<table>
<thead>
<tr>
<th></th>
<th>Dec-88</th>
<th>Dec-90</th>
<th>Dec-92</th>
<th>Dec-95</th>
<th>Dec-96</th>
<th>Dec-97</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSETS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>$2,195</td>
<td>$7,091</td>
<td>$4,053</td>
<td>$3,490</td>
<td>$3,030</td>
<td>$2,019</td>
</tr>
<tr>
<td>Accounts receivable, gross</td>
<td>3,574</td>
<td>4,248</td>
<td>4,025</td>
<td>6,132</td>
<td>6,259</td>
<td>7,622</td>
</tr>
<tr>
<td>Inventories</td>
<td>2,435</td>
<td>1,473</td>
<td>1,581</td>
<td>1,394</td>
<td>1,450</td>
<td>1,375</td>
</tr>
<tr>
<td>Net investment in sales-type leases</td>
<td>1,794</td>
<td>2,165</td>
<td>3,160</td>
<td>1,992</td>
<td>1,278</td>
<td>1,444</td>
</tr>
<tr>
<td>Other current assets, net</td>
<td>207</td>
<td>(50)</td>
<td>1,156</td>
<td>8,287</td>
<td>9,664</td>
<td>8,888</td>
</tr>
<tr>
<td><strong>Total Current Assets</strong></td>
<td>10,205</td>
<td>14,927</td>
<td>13,975</td>
<td>21,295</td>
<td>21,681</td>
<td>21,348</td>
</tr>
<tr>
<td>Property and equipment, net</td>
<td>2,711</td>
<td>2,868</td>
<td>3,530</td>
<td>4,648</td>
<td>7,127</td>
<td>15,435</td>
</tr>
<tr>
<td>Other assets</td>
<td>3,216</td>
<td>6,274</td>
<td>8,430</td>
<td>6,018</td>
<td>9,101</td>
<td>5,486</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$16,132</td>
<td>$24,069</td>
<td>$25,935</td>
<td>$31,961</td>
<td>$37,909</td>
<td>$42,269</td>
</tr>
<tr>
<td><strong>LIABILITIES and STOCKHOLDERS’ EQUITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable/accrued expenses</td>
<td>961</td>
<td>1,808</td>
<td>1,661</td>
<td>2,508</td>
<td>3,583</td>
<td>3,306</td>
</tr>
<tr>
<td>Accrued payroll and payroll taxes</td>
<td>409</td>
<td>1,626</td>
<td>241</td>
<td>1,702</td>
<td>1,743</td>
<td>1,753</td>
</tr>
<tr>
<td>Accrued restructuring charges</td>
<td>—</td>
<td>—</td>
<td>1,460</td>
<td>—</td>
<td>—</td>
<td>2,324</td>
</tr>
<tr>
<td>Other Current Liabilities</td>
<td>1,106</td>
<td>2,061</td>
<td>1,643</td>
<td>1,892</td>
<td>2,352</td>
<td>1,645</td>
</tr>
<tr>
<td><strong>Total Current Liabilities</strong></td>
<td>2,476</td>
<td>5,495</td>
<td>5,005</td>
<td>6,042</td>
<td>7,678</td>
<td>9,028</td>
</tr>
<tr>
<td>Obligations under capital lease</td>
<td>581</td>
<td>529</td>
<td>358</td>
<td>32</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>Deferred taxes &amp; other liabilities</td>
<td>631</td>
<td>1,994</td>
<td>2,010</td>
<td>1,598</td>
<td>2,586</td>
<td>3,508</td>
</tr>
<tr>
<td><strong>Commitments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stockholders’ equity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common stock, $.02 par value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10,000,000 shares authorized</td>
<td>70</td>
<td>72</td>
<td>116</td>
<td>123</td>
<td>124</td>
<td>128</td>
</tr>
<tr>
<td>Additional paid-in capital</td>
<td>11,718</td>
<td>12,138</td>
<td>14,080</td>
<td>15,161</td>
<td>15,618</td>
<td>16,340</td>
</tr>
<tr>
<td>Retained earnings</td>
<td>2,391</td>
<td>4,576</td>
<td>5,301</td>
<td>10,975</td>
<td>15,151</td>
<td>17,449</td>
</tr>
<tr>
<td>Less: treasury stock, at cost</td>
<td>(735)</td>
<td>(735)</td>
<td>(785)</td>
<td>(1,620)</td>
<td>(2,923)</td>
<td>(4,028)</td>
</tr>
<tr>
<td>Notes receivable-officers</td>
<td>—</td>
<td>—</td>
<td>(250)</td>
<td>(350)</td>
<td>(350)</td>
<td>(100)</td>
</tr>
<tr>
<td>Cumulative translation adjustment</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>(72)</td>
</tr>
<tr>
<td><strong>Total stockholders equity</strong></td>
<td>12,444</td>
<td>16,051</td>
<td>18,462</td>
<td>24,289</td>
<td>27,620</td>
<td>29,717</td>
</tr>
<tr>
<td><strong>Total liabilities and stockholders’ equity</strong></td>
<td>$16,132</td>
<td>$24,069</td>
<td>$25,935</td>
<td>$31,961</td>
<td>$37,909</td>
<td>$42,269</td>
</tr>
</tbody>
</table>
Exhibit 3: Lifeline Systems, Inc. - Three Generations of the Business
Doug Browning smiled involuntarily as he thought of the pleasant side of his imminent retirement in April 2004: more time with his family. At age 53 Doug’s retirement came after 28 years in government service and two years as Deputy Commissioner, second in command, of the United States Customs and Border Protection Service (CBP). Doug reflected on what should be the most important things he could tell his successor, Debbie Spero. Of all his CBP duties, he wanted to emphasize the importance and critical points for management’s focus on the Automated Commercial Environment (ACE) project. Attention to the ACE project, which was integral to business change within CBP, had occupied a third of his time as its lead coordinator.

Doug was aware that the project was running over budget and had reset some of its release delivery dates, but in general he felt comfortable about its progress. At the same time he knew that ten years of effort by so many on one of the largest civilian systems projects in history would be for naught if there were problems with upcoming Releases 3 or 4. These would deploy key screens for use at points of entry on the Mexican and Canadian borders. In the fishbowl world of government, a glitch on the screen of a customs officer checking the electronic manifest of a truck from Mexico could be front page news in the Washington Post.

ACE: BIG, MANY PLAYERS, AND MORE THAN AN IT SYSTEM

Once installed and successfully running, ACE would be the central IT system for CBP operations and vital for a myriad of other stakeholders. ACE would be used by 42,000 CBP personnel, thousands of corporate import-export departments and freight-forwarders in the global trading network, and by dozens of other entities using and feeding data. ACE received its initial annual appropriation from Congress in 2000, at which time the total project was estimated at $1.5 billion over five years. This made it one of the largest software projects outside the Defense Department in U.S. federal government history.

The core of ACE’s functionality was to support the work of customs officers and analysts, particularly the work in the field of inspection and duties-billing on commercial imports and exports. The system would replace the legacy system, the Automated Commercial System (ACS) and several others. Exhibit 1 shows the principle stakeholders with the information flows to and from ACE.
In addition to software replacement, ACE would enable and require a change in work practices by users. Customs inspection and billing would also change from transaction processing to “account management,” moving from the historical method of processing individual transactions to an account-based approach for clearance and billing purposes. Thus, if Walmart were the recipient of ten thousand containers through twenty ports of entry in the month of April, half of them requiring some import duty and dozens targeted for inspection, Walmart could, under ACE, receive a single statement of duties owed for the month and a consolidated report on inspection rather than the thousands of electronic and paper documents under the old system.

The “trade,” companies that depend on expeditious flow of goods into and out of the U.S., were critical stakeholders in ACE’s success. In General Motors’s supply chain, for example, there were hundreds of individuals managing the delivery of millions of parts and vehicles. Indeed, the trillion dollars of U.S. trade depended on CBP for the expeditious and accurate handling of goods. Starting from a history of conflict between the trade and Customs, the trade-CBP relationship in 2004 had evolved into a partnership whereby compliant traders were given a number of operational and business concessions that were designed to ease the burden of customs’ activities on their operations. These improved processes were a new part of ACE’s functionality.

As a result of the terrorism strikes of September 11, 2001, ACE had become a central part of the U.S. government’s security efforts. Anticipating, tracking, monitoring and inspecting shipments into the U.S. all depended on a reliable computer system with a complex architecture enabling interconnections with legacy and new databases, and legacy and new applications systems. ACE had quickly become, as a result of 9/11, not just a replacement or modernization driver but an essential piece of national security. As a central system and for historical reasons as well, ACE required interfaces with systems and interchange of data with many other federal government systems, such as those of the Food and Drug Administration, the Department of Agriculture, the State Department and others.

To achieve its intent and take advantage of current technology, the ACE project involved major technical innovations compared to its legacy systems. For example, the various online stakeholders would use a web-based platform and portal access. The basic technical architecture of the system and interfaces with key stakeholder groups is shown in Exhibit 2. Exhibit 3 shows the architecture in terms of technical features. One unusual feature of ACE compared to most government systems was the incorporation of some modules of a packaged Enterprise Resource Planning (ERP) system, namely SAP, which had been chosen from several qualified vendors.

The technical development and implementation of ACE was shared by CBP with a consortium of some 40 vendors led by IBM and known as the “e-Customs Partnership” (eCP). It was recognized as essential that these developers work closely with CBP’s own technical staff in planning and executing the transition from the legacy infrastructure and applications to ACE.

In 2004, ACE system development was organizationally a key part of the Modernization Office within the Office of Information and Technology in CBP. CBP was a principle agency within the Department of Homeland Security. (See Exhibit 4 for the DHS structure, Exhibit 5 for the CBP structure, and Exhibit 6 for the OIT and Modernization structure.) In addition to Doug Browning, the lead coordinator for ACE Modernization, key players were Woody Hall, former Assistant Commissioner, Office of Information Technology; Charlie Armstrong, Assistant Commissioner, OIT; Sharon Mazur of ACE Modernization Office, who was the project manager for ACE; and Larry Rosenzweig, who had particular responsibility for liaison between CBP field users, trade stakeholders, and the development teams. Browning and others stressed that success of the ACE project would depend not only on technical development and
technical transition from the legacy system, but also on the understanding, support and willingness to change processes and procedures on the part of CBP field personnel and other stakeholders.

The timeline of ACE releases is shown in Exhibit 7, and consisted of the following completed and planned as of April, 2004:

**Release 1**, accomplished in 2000, six months after contracting with the vendor consortium, essentially built the fundamental technology platform and architecture for ACE and the portal technology, in preparation for Release 2.

**Release 2**, 18 months after contracting with vendors, opened the portal for use for account purposes, providing a test of access to all users via the web, particularly for importing companies to eventually see their account transactions with CBP.

**Release 3**, scheduled for June 2004, would transform billing and payments from a shipment-by-shipment or daily basis to a monthly basis via the portal. In addition, Release 3 would enable importers to make duty payments, currently paid on a port-by-port basis on a national basis, for all duties due from all ports. An important feature of ACE would be manifested for the first time: the use of SAP modules, in this instance particularly the finance modules.

**Release 4**, was scheduled for November and December of 2004, and would bring to CBP officers for the first time electronic access to manifests for trucking crossing from Canada and Mexico, the US’s number one and number 3 world trading partners. CBP officers would have a portal that consolidated all enforcement and commercial information versus having to access multiple stovepipe systems. Observers noted this would be the biggest and potentially most vulnerable release of ACE in its long history.

Despite the importance and sensitivity of these releases, they accounted for only 30 to 40% of the total functionality of ACE. Complete implementation was planned for 2008.

As of December 2003, the outsourcing costs by the e-Customs Partnership were running $46 million over budget, representing under 10% of the firm outsourcing commitments to the e-Customs Partnership of vendors, and the project was six months behind schedule. On March 23rd, CBP obtained approval for its request for funding to cover the overrun.

Project Manager Sharon Mazur reported in March 2004 that, in general, feedback from the field and other stakeholders had been very positive with respect to plans and testing of preliminary and limited versions of the system.

**A LONG TIME IN COMING: THE EVOLUTION OF CONTEXT AND COMPLEXITY**

As Doug Browning contemplated the focal issues that would affect the success or failure of ACE, he believed issues and problems were rooted in the long history and increase in complexity of the project, and that understanding this evolution was important.

Since its creation as the fifth act of Congress in 1789, the rules and procedures of the Customs Service have been imbedded in legislation. The basic customs officer’s work and the forms and type of data in 2004 would have been recognizable to a customs officer in New York Harbor in 1904 or to Nathaniel Hawthorne when he served as a customs inspector in Salem, Massachusetts around 1804. Mechanization had come with the typewriter and increasingly with several generations of computer-based automation beginning in the 1960s, but these changes essentially automated the traditional, legally-prescribed rules and procedures without changing the process or the work. By the late 1980s the U.S. Customs had become a bottleneck to trade. The value and volume of international trade had increased dramatically (see Exhibit 8); automated transportation and handling sped up as containers came into use. Change in the customs practices had not kept pace.
TRADE RELATIONS: FROM “GOTCHA” TO COOPERATION

The customs bottleneck had serious impacts on the trade. Delays and uncertainty around timing the delivery of imported parts, for example, threw off companies’ ability to make breakthrough improvements in supply chain management, such as allowing for “just-in-time” delivery of parts shipped from abroad. Transaction-by-transaction financial processing meant labor-intensive clerical costs. Lost savings and revenue in the billions of dollars were at stake for companies and the U.S. economy. The process generated confrontation, evasion and conflict between Customs and the private sector, described by one observer as Customs playing “gotcha” vs. the traders playing “catch us if you can.”

Customs staff began to conceptualize new processes. A tone was set in the early 90s by Customs Commissioner Willy Von Raab’s strong position, who said to importers that they and Customs must “automate or perish.” These efforts formed the basis for ACE design:

Instead of looking at each import as “things” independent of the recipient we began to think of targeting (what to inspect) and billing in light of ‘entities,’ the companies that were benefiting. We designed a streamlined process by first looking at a company’s compliance history in the same way a credit card company examines credit history and credit worthiness. We wanted to use that to become more selective in our targeting and more comprehensive in our billing. Instead of inspecting based on what was imported we would include who was importing it and what their compliance record had been. Instead of billing for the duties on each separate import we would bill monthly or quarterly. These approaches would eliminate a tremendous amount of paperwork.

—Charlie Armstrong, Assistant Commissioner (Acting)

With high expectations, in the mid 1990s Customs went to Congress for approval and funding of the early ACE project. At that time, however, some major and much publicized government systems failures were occurring, such as the Social Security system and the development of new Internal Revenue Service systems. The Customs project was rejected by Congress. Customs went back to the drawing board, confident their conceptual redesign was on the right track but needing new approaches to gain Congressional support. Meanwhile, the discontent was growing among traders dependent on getting goods through the bottleneck. The setting was right for a new approach. As one participant at the time put it:

We tried to get a project approved by Congress and it got blocked. So Commissioner Von Raab forced us to think of new approaches. We turned to importers and started to move away from the adversarial relationship with them.

—Sam Banks, former CBP Manager

Customs realized that they and the traders were in the same boat; trade companies were receptive to collaboration. A three-year discussion began that resulted in the Customs Modernization Act of 1993. Among other things, including regulations for the new North America Free Trade Association, the Act mandated that Customs and the importing community adopt shared responsibility for compliance. For Customs, this meant a policy of “informed compliance” by which they let the importing community know what was expected of them. For the trade it meant adopting “reasonable care” in their dealings with Customs, including doing their own audits, creating their own offices of compliance and offloading work previously done by Customs staff. Customs retained oversight and controlled the process with rewards and penalties.

In 1997 a trade group was formalized as the “Trade Support Network” (TSN), an association of 170 of the largest U.S.-based importers and exporters which would work in a cooperative
way as a partner to Customs, dealing with issues and problems in a spirit of complementarity. Representatives of the TSN began to work with Customs on the design of ACE, offering suggestions and ideas and taking back to their companies an understanding of what such a system, should it ever be approved and implemented, would mean in terms of their own processes and technical interfaces. The relationship resulted in some immediate improvements and enhancements to the design of ACE. Customs managers who had participated in this saw it as the culmination of an unusual evolution in the relationship of a regulatory governmental body with private business entities. One experienced outsider saw it as quite unique and as a “best practice” in government. As it turned out, improved system design and planning for implementation was just one of the benefits of the Trade Support Network.

FUNDING ACHIEVED

Shortly after the Customs/TSN relationship was formed, Customs managers began to engage TSN committees and individual companies within it—like General Motors— which were critically dependent on an efficient trading system, to approach and lobby Congress to support ACE and Customs modernization. This led to an initial foundation funding appropriation in 2001 in the amount of $130 million. A program office was established and system design was begun.

BEGINNINGS OF OVERSIGHT, BEYOND IT, AND IT OUTSOURCING

As TSN was partnering with Customs to fund ACE, the nature of the project was changing. The bad experience with systems development and systems failures elsewhere in the federal government led to the Clinger-Cohen Act in 1996. The act charged the General Accounting Office (GAO) with the responsibility of reviewing IT project proposals and imposed some specific principles for design and project management. These forces, plus advances and new opportunities in the technical environment, resulted in more enhancements to ACE design. The GAO played a significant role. For one, it recommended that before the project begin there be an enterprise architecture approach, enabling the particular system to be designed and delivered in the context of other technical linkages. Also, as a result of the Modernization Act of 1994, the GAO and Customs came quickly to see that the “IT project” initially envisioned should be conceived of more as a business change or modernization project. Finally, the GAO also strongly recommended that Customs not attempt to build the system internally, but that it be outsourced.

In 2004 Charlie Armstrong reflected on the impact on IT staff in Customs of the project becoming a business process change project and on the audit and advisory role of GAO:

*In the early 90s we did not understand the scope and magnitude of this project. It took a while before we realized 'this is really big.' It was not just technical, it was business reprocessing. As technicians there was intimidation because there was a huge stakeholder group, the trader, who understood some of the newer technologies. We did not want a repeat of what took place with ACS [the legacy system] where the stakeholders in the trade were screaming at us.*

*We needed to completely change our orientation and come up with something that made business sense, or as we put it, ‘A whole new way of getting the trade involved and getting trading done.’*

*Then we had the GAO people saying about us, ‘The folks in Customs do not have the bandwidth to get this done internally.’ Our IT management went through a lot of soul searching...*  

—Charlie Armstrong, Assistant Commissioner (Acting)

From a technical standpoint, Customs designers of ACE observed how the Web took off in general in the early 90s. They wanted to take advantage of the Web, but were concerned about the security issues.
How do we take mission critical systems governed by laws and put them on the Web where people can see the information and manipulate it. This challenge was beyond our internal expertise and necessitated the need to have an integrator with that competence help us.

—Charlie Armstrong, Assistant Commissioner (Acting)

The decision to outsource led to an achievement of some importance for the ACE project. When the request for proposals (RFP) went out on December 18, 2000, vendors of considerable size and experience showed interest. These included IBM, Lockheed Martin, Computer Sciences Corporation, EDS and many others. Recognizing the urgency of getting the project underway, a few of the leading potential prime contractors got together and worked with Customs to form a large vendor consortium. The resulting e-Customs Partnership (eCP) was headed by IBM and governed by IBM and four other contractors. The time from letting the RFP to award of the contract was four months, an unprecedented short period. Customs received an award from the Interagency Resource Management Conference, an association of government agencies interacting around contract management issues, for the effectiveness and expeditious nature of the contract process.

REVERBERATIONS OF 9/11

The scope and importance of ACE changed significantly as a result of the fallout from 9/11. The creation of the Department of Homeland Security resulted in the merging of the Customs Service, the Border Patrol and the inspection functions of the Immigration and Naturalization Service (INS) and of the Department of Agriculture (APHIS). Overnight, the number of potential users of ACE more than doubled, to 42,000 users. It was expected that Border Patrol officers and a host of other monitoring bodies would have access to ACE’s information on goods crossing U.S. boundaries. In addition, the Trade Act of 2002, emphasizing security, moved the functions of security and “targeting,” the identification of shipments entering the US which needed inspection, to the highest priority for development and implementation. In particular, it was required that any trans-border shipment had to have its manifest information submitted electronically prior to arrival in or departure from the U.S. This put ACE in a central role at the heart of a key part of U.S. national security.

Collaboration across agencies within and outside of DHS for purposes of improved security checking became the highest priority. A “National Targeting Center” was announced for this purpose. Information and data from very different sources including other agencies—such as the Central Intelligence Agency (CIA), the Federal Bureau of Investigation (FBI) and the U.S. State Department—would have to be available and factored into the analysis of participants in the supply chain of imports.

The net effect of these changes did not increase the size of ACE per se, but shifted priorities and called for extensive reorganization, rescheduling and more coordination of work across agencies. Yet many saw the added urgency as a plus to the project:

I don’t see the security emphasis as a problem for us as contractors in the long run. Security as a priority will bring us together better with our CBP partners on the project and with all the other agencies’ staff involved. It will still be difficult, as each agency is still charged with doing its own thing as well as now charged with sharing and collaborating. Those two directives can be very hard to reconcile.

—Brian Helmey, Program Executive, IBM

Despite the potential value of connecting ACE to other systems, by April of 2004 the Department of Homeland Security (DHS) had not settled on the development of the National Targeting Center database, nor where it would be housed organizationally, nor if there would be a central or peripheral role for ACE. ACE managers knew if new parameters for an overall DHS architecture were to emerge there could be added costs and delays in ACE.
COMPLEXITY BEGETS GOVERNANCE
BEGETS COMPLEXITY

These events, decisions and uncertainties had important effects on the ACE project as it was in 2004. The formation of the Trade Support Network had clear beneficial results in terms of collaboration with that group of key stakeholders, including not only systems design and potentially more effective implementation but quite directly in achieving Congressional funding. The collaboration among vendors in the e-Customs Partnership represented a significant improvement in time needed to line up outsourcers. The federal government’s congressional stimulus in the form of the Modernization Act and the Clinger-Cohen Act created a basis for valuable oversight on the part of GAO and for thinking more broadly about ACE as a business process change program rather than strictly an IT systems upgrade.

At the same time, the several roles of TCN and government stakeholders and overseers, the outsourcing dependence, the criticality of ACE in national security, and the need for continued funding justification required more rigorous and reliable program and project management. In addition to tightening its own practices in these areas, OIT and the Modernization Office of CBP engaged Mitre Corporation to provide technical guidance, oversight and independent validation of the development work. Program management itself was enhanced by an engagement with the firm of Robbins-Qioia, particularly in helping to control requirements changes, dealing with vendors, and budget and time controls. A strong indication of the success of these efforts came with the achievement in 1993 of CMM Level 2 designation to CBP’s OIT unit in the area of “software acquisition and repeatable process,” the first of any US Federal Government agency so recognized.

When he became Deputy Commissioner of CBP in 2002, Doug Browning took actions intended to further engage Customs’ leadership in ACE and to reinforce the project as one aimed at business change and not just IT replacement. In 2004 he reflected on what he found on taking on his senior position:

When I looked closely I thought we in management were saying the right things about the importance of ACE and the need to change the way we do our work, but it still looked too much like an IT project. I wanted to make it clear that the ACE project was going to be the tool that would drive everything that takes place in dealing with the trade, including enforcement and security.

Doug found that most of his direct reports, the Assistant Commissioners, were delegating their role of oversight of ACE to their staff assistants (see CBP organization chart, Exhibit 5). With the Commissioner’s full support Doug revamped the governance process by abolishing what were then work teams cutting across the CBP organization and putting all CBP governance under the Modernization Board (see Exhibit 6). All Assistant Commissioners became Modernization Board members, and all ten were made to understand that the project was to be “strategic” in each of their areas of responsibility. Each was made accountable for the results of their aspects of the project, and such accountability became part of their performance reviews.

A second action taken by Doug was the creation of a “Business Executive” position in parallel with the ACE Executive Director on the IT side, reporting directly to him. He filled the position with Larry Rosenzweig, a manager with 31 years of Customs field experience. The job was created to insure that the business requirements were understood by the IT developers and that the business users were aware of the impact of releases on their work. Rozenzweig initiated a series of mechanisms to communicate, prepare and ensure a channel of mutual influence between the future users of ACE and the designers and developers. He created a team of “ACE Ambassadors,” 105 people from the field who were trained in ACE and what it would do, who then went back and informed their colleagues. Larry shuttled regularly back and forth, providing input to the development people as well as the users.
Doug also created a position entitled “Organizational Change Management” but by April 2004 it had not been filled.

These decisions and impacts, ranging from the creation of the Trade group to changes wrought by 9/11 to governance reinforcement and leadership accountabilities, were seen by those in Customs as having accomplished positive results as intended. At the same time, each was also recognized as adding complexity to ACE program management and to the process of achieving coordination and approval toward progress. In 2004, leading stakeholder managers saw project governance and management of ACE as more complex and cumbersome than a similar project would have been even a few years earlier. Exhibit 9 shows the major governance structure and principal oversight bodies in 2004. Sharon Mazur, project manager, estimated that she spent on average a day a week in hearings and reviews, reporting on progress and answering questions from oversight bodies.

For Mazur and others in CBP the funding process had become more burdensome and difficult than before. The $46 million overrun by the outsourcers had resulted in a request for payment which CBP had submitted in August of 2003 through the payments process. The payment represented outlays already made by the vendors, and the delay in reimbursement had become a potentially serious bone of contention. The request was finally granted in late March 2004. It was estimated that the development and approval of the fiscal year 2004 expenditure plan, including coordination of external reviews and oversight questions had occupied some 5,000 man-hours, roughly equivalent to five people working full time for six months.

In addition, there was concern in 2004 over issues of collaboration between the outsource contractors and some of the technological staff within OIT in CBP. Eventual success with ACE depended critically on an evolutionary transition from the old system to the new; it was not to be a “big bang” cutover. This required highly effective planning, communications and motivated parties on both sides. Some observers noted that the potential effects of the new platform and the new ACE systems on jobs of the legacy technicians could be anything but positive, yet these experienced technicians were expected to help their private contractor counterparts, higher paid professionals who would go on to the next big contract job when ACE was completed.

Finally, the size, criticality and interconnections of ACE in the politically charged government environment of 2004 meant that events like terrorist threats, funding priority changes and economic news, all beyond ACE project and CBP control, could at any time have significant negative effects on project delivery and on the very scope and functionality of the project.

DOUG BROWNING’S LEGACY?

Doug Browning wanted to do what he could to continue CBP’s commitment and effort on ACE. He believed the results to date had been successful. Evidence from the field for the anticipated upcoming releases indicated there was acceptance and support and a desire to make the system work. He believed there were good communications between field personnel and the developers. Although the future of the IT staff in CBP was uncertain, Doug thought that success with the field would set the stage for those changes to be successful as well. He knew that much had to be done and that the implementation of Releases 3 and 4 was critical to long term success. As he put it: “Release 4…that’s huge…”

Doug began to draft his memo to prioritize issues and critical success factors for his successor.

QUESTIONS FOR PREPARATION FOR CASE DISCUSSION

1. What are the three most important issues facing the ACE Modernization project?
2. What actions and approaches would you recommend to Doug Browning’s successor?
3. What other questions would you ask of CBP personnel to improve your understanding and recommendations?
Exhibit 1: Stakeholder Information Flows

Exhibit 2: Ace System Architecture – Functional View
Exhibit 3: ACE System Architecture—Technical View


As of Thursday, August 14, 2003
Exhibit 7: The ACE Timeline

Exhibit 8: U.S. International Trade Selected Data

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Exhibit 9: CBP Modernization Office Governance Framework

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<td></td>
<td>Commissioner Chair</td>
</tr>
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<td>Deputy Commissioner &amp; Designated Assistant Commissioners</td>
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<td></td>
<td>Department Representatives</td>
</tr>
<tr>
<td></td>
<td>Advisory Members</td>
</tr>
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<td>Customs and Border Protection Modernization Board of Directors</td>
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<td>Designated Assistant Commissioners</td>
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<td>CBPMO &amp; Field Representatives</td>
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<td>Assistant Commissioner, Office of Information and Technology (OIT)</td>
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<td>Modernization Management Team (Program Level Planning, Oversight, and Reporting)</td>
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<td></td>
<td>Executive Director, Customs and Border Protection Modernization Office (CBPMO) Chair</td>
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<td></td>
<td>OIT Direct Reports</td>
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<td></td>
<td>CBP Business Representatives</td>
</tr>
<tr>
<td></td>
<td>CBPMO Acquisition Directors</td>
</tr>
<tr>
<td></td>
<td>Systems Integration Contractor (Project Level Execution and Implementation)</td>
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</tbody>
</table>
Outdoor Wireless at MIT

Project Status Report #4
4/28/2005

Team Wireless
Janice Lin, Jessica So, Ashvini Thammaiah, Harel Williams
**Team Status: GREEN**
We able to overcome some obstacles that had put us back, so we are back on track and have a good chance for achieving the project as we have originally planned.

I. Accomplishments

Since the last report, list the significant accomplishments, not just activities but a mention of the value delivered or obtained. Mention any positive opportunities that have arisen.

Our university team has received information from four universities: University of Virginia, Columbia University, Carnegie Mellon University, and Georgia Institute of Technology. We are also waiting on the completed interview from Florida A&M and Goucher University. We have started comparing the universities with the information we have to come up with conclusions.

From this information, our team met in order to discuss the desired final deliverables. We plan on synthesizing our information to fulfill the following goals:

1. Comparing information on a chart
2. Making recommendations on limited findings
3. Advising the IS&T team on next steps of research
4. Highlighting top factors to consider when implementing their pilot program this summer.

We were also finally able to meet with our Project Champion, Ms. Reagan, who has approved our deliverables.

II. Issues

List and explain the barriers or problems that have arisen since the last report. Explain these in terms of the uncertainties and risks as outlined.

The only issue our team had was getting in touch with our project champion to make sure that our ultimate goals were in line with her expectations. We were hesitant to move forward without talking to our project champion. But with some help from Prof. Gibson and Mr. Wining, we were able to schedule a meeting and have a constructive discussion with her. So now we are able to move forward to complete the analysis and conclusions.

III. Actions to be taken

List all specific action steps to be taken, other than those contained in the latest project plan revision, to take advantage of new opportunities or deal with new issues. State these actions in terms of tasks, milestones and deliverables. Indicate modifications to most recent tasks, etc.

The biggest task facing our team is to present our information to the class and our project champion in an oral report next week. We have constructed an outline that will shape our content. Our group simply needs to meet again this weekend to extract the relevant information, agree on recommendations, and practice the speeches.

IV. Reflections and Learning

Use this to report on how this project or the larger IS&T project have relevance to the latest completed topic module in 15.568. Also, beyond that, step back from project work and reflect on
what you and the team are learning. Include particularly more or less personal surprises and challenges that were unexpected.

The last unit has framed our group’s mindset to an executive level. For our final deliverables we plan on emphasizing strategy in all the recommendations we make for IS&T. For example, we realize that IS&T does not want a disruptive, invasive wireless system. Reflecting those wishes, we will try and make system recommendations based on our vendor and university information that best supports IS&T’s goals.
Due Diligence for the MIT Portal

Final Report

May 12, 2005

15.568 Practical Information Technology Management

Professor Cyrus Gibson
TA Evan Mamas

MIT Portal Team:
Tiffany Kosolcharoen
Susie Lee
Adam Powell
Armando Valdes
# MIT Sloan School of 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 Executive 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 create 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 of 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.”

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

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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

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<td>Total</td>
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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

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cooperation from stakeholders enabled large and expedient change. 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.

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”. The scope of the project did necessitate a large

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4 Linder, Jane. “AIRNow: Arming the Public with Air Quality Data”
5 First National City Bank (HBS)
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

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⁷ Discussion with Arup Gupta, Tata Consultancy Services  
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

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\(^9\) Discussion with Rich Reich, CIO, Lifeline

\(^{10}\) Gibson, C., “First National City Bank” (A)-(B-1) (HBS)
features that have been developed.\textsuperscript{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 Carolina State University created a manageable timeline for each individual stakeholder (Exhibit 6). People

\textsuperscript{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.\footnote{Randolph, W. Allen and Barry Posner (1988): What Every Manager Needs to Know about Project Management, MIT Sloan Management Review, p. 66}

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,
regular deadlines helped us accomplish tasks incrementally and allowed us to evaluate our progress often. 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. 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.

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13 Discussion with Ben Porter
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 consortia 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: ___________________________________

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**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

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**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.
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

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

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\(^\text{16}\) 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

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\(^{16}\) 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

[Image of SAPweb interface]

**SAPweb** MIT's web interface to SAP

**Today's date:** 06/04/2004

**Inboxes** | **Purchasing** | **Accounting** | **Transactions**
---|---|---|---
**View/Update Labs and Other Room Sets** |  |  | **Facilities**
**Look-ups**
**Look Up a Person** |  |  | **EHS**
**Report on Training** |  |  | **Reporting**
**Display Rules for Training Requirements** |  |  | **Settings**

**Employees** | **Facilities** | **EHS** | **Reporting** | **Settings**
---|---|---|---|---
**What can I do?**
**Facilities Request Form**
**Facilities Repair Status**

**Resources:**
**The EHS Management System**
**The Environment@MIT**

*Business support hours: Daily from 8:00am to 6:00pm EST.*
Exhibit 2: 2005 SAPwebss (Self Service) Design

What is Self Service: Benefits?

Self Service: Benefits is designed to offer you the flexibility and convenience of using the web to manage your MIT benefits in one place, at the same time. Each feature is described below.

About Benefits Enrollment
For newly eligible faculty and staff only: Click on Benefits Enrollment to enroll in MIT benefits for the first time.

About View Your Benefits
For all eligible faculty and staff: Click on View Your Benefits to see your MIT benefits in which you are enrolled.

About Tuition Assistance (TA)
For all eligible faculty and staff: Click on Tuition Assistance Account to submit an online reimbursement request or to check the status of your reimbursement requests. Click on the HR Tuition Assistance Home Page for a description of TA services and programs, eligibility requirements, and application procedures.

About Fidelity netBenefits 401(k) Account
For all eligible faculty and staff: Click on Fidelity netBenefits 401(k) Account to enroll in or renew your existing MIT 401(k) Plan on Fidelity’s website.
Exhibit 3: Open and Restricted Content on the insideMIT Portal

Open Content

- Pull from existing MIT content:
  - News office headlines
  - MIT Spotlight
  - MIT directory search
  - Google search

- Link to:
  - Productivity applications
  - SAPweb applications
  - Self service applications
  - Events calendars

Restricted Content

- MIT TechTime, MIT WebMail
- Purchasing, Accounting, Facilities, EHS, Reporting
- Personal Info, Benefits, Training, Money Matters

Exhibit 6E: Mockup of insideMIT Portal

Bibliography


“Administrative Intranet Migration”, Steve Landry et al., 10 September 2004. (Internal)

“Effective University Portals: Evaluation of Departmental Participation, Content, and Features”, MIT Information Services & Technology, Date unknown. (Internal)
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 Announcements
- ACES, discussion forum and webmail Personal bookmarks
- Blackboard Course Announcements Sticky notes
- Discussion forum (DevilTalk) Access to webmail
- 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)

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

B. **Graduate/Professional Student Advisory Group**
   - GPSC - Pratt School of Engineering
   - Graduate School - Divinity School
   - Fuqua School of Business - School of Nursing
   - Law School - 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 - Athletics
   - CIT - Faculty
   - Provost Office - News & Communications
   - Library - SISS
   - Trinity Dean - Pratt Dean
   - Registrar - Bursar
   - Admissions - DukeCard
   - Campus Services - International Office
   - Alumni/Development - Pre-Major Advising
   - Arts & Sciences - Financial Aid/Student Loan
   - Duke Stores - 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)

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<tr>
<td>.25</td>
<td>Systems Administrator</td>
<td>28,814</td>
</tr>
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</table>

**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.

Bibliography

Telephone interview between Deborah Johnson, Vice Provost and Director of Student Administrative Services, and Tiffany Kosolcharoen, April 9th, 2005.


Duke Information Advisory Council, Final Committee Report.
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 Liaison 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,\(^\text{17}\) 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”\(^\text{17}\)

At the time, Sloanspace was a pioneer in educational open source technology.\(^\text{18}\) Today, the .LRN community, “An open source product to support learning and research communities”,\(^\text{19}\) 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.”\(^\text{20}\)

\(^\text{17}\) http://www.dotlrn.com/case-study/mit-sloan/
\(^\text{18}\) Blackboard’s <http://www.blackboard.com> academic suite of programs is the most commonly chosen alternative to open source or customized programming.
\(^\text{19}\) http://www.dotlrn.com/
\(^\text{20}\) 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.
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.

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software</td>
<td>Windows 2003 SQL licenses</td>
<td>$50,000</td>
</tr>
<tr>
<td></td>
<td>Novell licenses for identity management &amp; eDirectory project</td>
<td>$75,000</td>
</tr>
<tr>
<td>Consulting</td>
<td>IBM Consulting Services</td>
<td>$125,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$250,000</td>
</tr>
</tbody>
</table>

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 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.
Appendices

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 Consortium (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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Telephone interview between Jim Lewis, Associate Director of the Systems and Operations Division and Armando Valdes, April 19th, 2005


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

MIT Sloan School of Management

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

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 is in 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 Committee was originally 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 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 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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MIT PORTAL PROJECT

15.568 Practical IT Management
Spring 2005

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

Sponsored by: MIT Information Systems & Technology

I. Context for the Project

Last summer, MIT IS&T received feedback from its trainers and support staff that users were having difficulty navigating MIT’s web services in their current states. It felt that a portal was needed so that MIT employees could more readily navigate the services available to them. IS&T allocated a small percentage of its resources in order to create a business requirements document for the portal, and a functional design for the portal.

Although IS&T would like to go ahead with the project, they need to have the background information to assess what kind of time and resources will be necessary to complete the portal. They will use this information both to determine the project’s priority (relative to other IS&T projects), and to resource allocation.

II. Purpose, Objectives and Approach of the Project

Purpose: Research existing portal implementations of similar scope to determine necessary costs and resources for the creation of and administrative portal at MIT. Determine whether a portal implementation should be created on top of the existing SAP web, or go to a new platform, and create documentation that will help IS&T determine the course of the portal implementation.

Objectives:
1. Determine necessary costs and resources, with specific attention to employee utilization
2. Identify portal implementation issues
3. Identify portal operational issues
4. Document best practices
5. Create reliable documentation that MIT IS&T can refer to when they undertake the project itself.

III. Tasks, Milestones, and Deliverables

1. Planning (~1 weeks)
   a. Preliminary Meeting with sponsors
   b. Collect existing documentation
   c. Create project plan
   d. Determine current situation
   e. Deliverables:
      i. Project plan 3/3
      ii. Contact List (with project plan)

2. Research
   a. Review existing documentation
   b. Meet with MIT IS&T personnel
   c. Get walk through of existing portal
   d. Create external interview guide
   e. Identify institutions and contacts – including non educational and non-SAP implementations - Three schools preferably with similar demographics, requirements, and SAP
   f. Conduct external interviews
g. Deliverables:
   i. Interview Guide
   ii. Status Reports

3. Analysis
   a. Synthesize – write ups of interviews
   b. Assess MIT culture and adaptability to change
   c. Deliverables:
      i. Interview write ups
      ii. Status Reports

4. Presentation
   a. Deliverable: Presentation

5. Final Report
   a. Deliverables: Outline, PowerPoint presentation

IV. Uncertainties, Risks and Opportunities, and Planned Responses

There are many possible uncertainties and risks in this project.

1. Availability of information
   a. We need to find comparable systems
   b. Representatives from these institutions have to be willing to be interviewed.
   c. Plan: If there are no comparable systems, we will examine the systems that do exist.
      Moreover, many possible institutions will be identified. Therefore, if there representatives
      from our top choice institutions are unwilling to talk to us, we will move to the next list.

2. Accuracy
   a. Information needs to be accurate so that IS&T can trust the documentation. This may be
      difficult if the main information source is through interviewing outside sources.
   b. Plan: The requirements document will be a starting point. Also, we will try to ask
      representatives for as many quantifiable data points as they are willing to or able to give us.

3. Accurate comparison
   a. Given MIT IS&T’s preference for SAP, the team must be able to give an unbiased
      assessment and recommendation. This may be difficult.
   b. Plan: Examine at least one non-SAP portal implementation and assess its relevance and
      feasibility to MIT. That way, other non-SAP possibilities will be examined.

4. Project management
   a. Timelines may not necessarily be accurate. Some tasks may take longer than projected.
   b. Plan: The timeline has plenty of leeway between each deliverable and a cushion of time
      before the final presentation. Therefore, if certain things take longer, the timeline can be
      adjusted without struggling to meet the final deadline.

V. Critical Success Factors

1. External Interviews
   a. Access – It is important that the team find contacts at institutions with portal implementations who
      are willing to speak with us
      i. We will first use the business requirements documents that we have been provided by
         IS&T
      ii. Next, IS&T will put us in contact with various consortiums that IS&T is a member of.
         These contacts will hopefully lead to interviews.
   b. Accuracy – Because MIT IS&T will be depending on this information, it is imperative that the
      time, cost, and resource estimates be accurate, and not just anecdotal.

2. Internal Interviews
   a. Portal walkthrough – The team needs to meet with the IS&T contacts to fully understand the
      existing functionality as well as the requirements to the new portal.
   b. Access and communication – This problem will be addressed through biweekly meetings with key
      stakeholders.
3. Conceptual Understanding
   a. Needs assessment – The team needs to accurately understand exactly what is within the scope of the project. The purpose is not to build the portal, but to understand how IS&T would build it
   b. System – The team needs to learn and understand both the back end that the portal will provide access to, and what the portal will be replacing. This frames the questions that will need to be asked during the external interviews.

VI. Project Timeline

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VII. Gantt Chart

- Project Plan
- Pick Interview Candidates
- Meeting with Key Players
- Internal Interviews
- Status Report
- External Interview Template
- Meeting with Key Players
- Status Report
- Progress Assessment w. P
- Meeting with Key Players
- External Interviews
- Status Report
- External Interview Writeups
- Progress Assessment w. P
- Status Report
- Project Presentation
- Report
MIT PORTAL PROJECT STATUS REPORT
March 16, 2005

15.568 Practical IT Management
Spring 2005

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

Sponsored by: MIT Information Systems & Technology

Provide a dashboard light of the overall prospects for achieving the project as laid out in the original project plan: green, yellow, or red

Objectives Status
1. Determine necessary costs and resources – Green
2. Identify portal implementation issues – Green
3. Identify portal operational issues – GrDoeen
5. Create reliable documentation – Green

I. Accomplishments
Since the last report, list the significant accomplishments, not just activities but a mention of the value delivered or obtained. Mention any positive opportunities that have arisen.

In preparation for a meeting with Wayne Turner, Amy King and Mike Berger on Wednesday March 9, Stephen Landry sent our team a compilation of documents outlining business and technical requirements for the MIT portal. Based on the documents and the subsequent meeting with the IS&T team, we identified the following list of issues that IS&T expects the portal implementation to solve:

- The current gateway design to administrative services emphasizes task-based grouping of applications, but client Department, Labs, and Centers (DLCs) have expressed a preference for categories dedicated tabs for their DLC.
- The lack of enforceability of these design choices have resulted in an inconsistent gateway categorized by both tasks and DLCs, which in turn makes navigation very difficult.
- The gateway’s horizontal tab design results in tab-crowding and poor usability due to horizontal scrolling.

Additionally, the MIT portal seeks to integrate 8 services (administrative transactions, self-service transactions, institute forms, institute messages and announcements, event calendars, WebMail, TechTime, and Transportation and Parking schedules) into a “one-stop-shopping” site in order to enhance user productivity and generate greater awareness of new functionality. Users of the portal will be divided in three categories: students and faculty, general users, and accounting officers.
Based on these requirements, we have selected two external universities and an internal
department to conduct interviews and study their portal implementation: California
Polytechnic (MyCalPoly), Stanford University (MyStanford), and the MIT Sloan School
of Management (SloanSpace).
Specifically, in studying the portal implementation of these universities and departments,
we have identified a set of questions that we can use to assess the amount of human and
financial resources needed to successfully implement the portal:

- Obtain accurate figures of time and cost
- Determine the scale and scope of other portals
- Specify the skill-set needed to develop the project
  - Get roles and job descriptions of people involved in the project
- Estimate maintenance needs after development

II. Issues
List and explain the barriers or problems that have arisen since the last report. Explain
these in terms of the uncertainties and risks as outlined.

Up to now, we have not encountered serious problems or challenges in the project. The
IS&T team has been extraordinarily helpful and has assisted us in meeting our objectives.
In particular, the team has provided us with specific documents we had requested and that
have allowed us to determine the requirements and to select comparable portals to study.

At this point, we believe that the most probable source of risk is the availability of
information from external sources. Specifically, representatives from the institutions
outlined above (California Polytechnic, Stanford, and Sloan) must be willing to be
interviewed about their portal implementations. Although we have a list of back-up
institutions that could be contacted, we plan to foster more productive and sincere
interviews by adopting a first-mover position and providing interviewees with a case
study of MIT’s portal implementation.

III. Actions to be taken
List all specific action steps to be taken, other than those contained in the latest project
plan revision, to take advantage of new opportunities or deal with new issues. State these
actions in terms of tasks, milestones and deliverables. Indicate modifications to most
recent tasks, etc.

We are in the process of creating guides and templates to use when interviewing external
sources. In particular, we want to outline a standard procedure for each of the interviews
so that we can easily compare relevant and uniform data across all institutions. We have
determined that the best way to do this is to write a case study of MIT’s portal
implementation and use it as a template to generate respective case studies of portal
implementations at selected institutions. We expect using parallel case studies will help
us in analyzing data and furnishing accurate human resources and financial estimates for
the MIT portal.
The following outline illustrates the immediate steps in the project:

1. Write MIT-based case study
2. Contact Steve Landry, Wayne Turner, and Paul Hill to obtain contacts from SloanSpace, California Polytechnic, and Stanford respectively.
3. Furnish interview templates
4. Disseminate MIT-based case study to contacts from external institutions

IV. Reflections and Learning

*Use this to report on how this project or the larger IS&T project have relevance to the latest completed topic module in 15.568. Also, beyond that, step back from project work and reflect on what you and the team are learning. Include particularly more or less personal surprises and challenges that were unexpected.*

We learned this week that the portal redesign is being driven partially by a non-technical problem. Originally, IS&T had wished to divide the portal into a set of functional tabs. They were compelled to let one group add their department's name to the set of tabs, and soon, the whole organizational scheme of the site broke down. The new portal will also serve to assist in process redesign, as the way that tasks are being organized is being modified into a different structure.
MIT PORTAL PROJECT STATUS REPORT
March 30, 2005

15.568 Practical IT Management
Spring 2005

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

Sponsored by: MIT Information Systems & Technology

Provide a dashboard light of the overall prospects for achieving the project as laid out in the original project plan: green, yellow, or red

Green  Task completed or able to be completed on deadline
Yellow Task has missed the deadline by two weeks or less
Red Task has missed the deadline by more than two weeks

Objectives Status
1. Determine necessary costs and resources – Green
2. Identify portal implementation issues – Green
3. Identify portal operational issues – Green
5. Create reliable documentation – Green

I. Accomplishments

1. Contacts: Wayne has made preliminary contact with the following schools/organizations:
   a. Duke – Deb Johnson, Assistant Vice Provost and Director, Student Administrative Services
   b. Baylor – Bill Bevil, CSE, Senior Project Manager
   c. *University of Cincinnati – Jim Lewis, Associate Director
   d. Central Michigan – Renae Eckland, Director of Information Technology
   e. Sloanspace
   *starred organizations are those with SAP portals

   We are still waiting for responses from several other schools, including specifically schools with SAP portals. However, considering we had only initially expected to interview three portal administrators, this response is very good.

2. Interview Template: We have created an interview template (please see attached). Once this is approved by Wayne, we will begin our external interviews with the above schools.

3. MIT Case Study: We have created a draft of the MIT case study. Obviously there is no portal implementation yet at MIT, but we have filled in as much information as
possible. Ideally, those schools that already have portals will be able to provide more information for their case studies.

4. **Portal Scope and Definition**: We created the following definitions for our project:

   **MIT Portal Scope**: “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.

   **Portal Definition**: 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-on1 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.

II. Issues

There have been no barriers yet. Wayne was able to get a good response through his preliminary contact. The fact that these people have responded so quickly and positively is a good sign for the rest of our interview process. Ideally, we would like a few more schools with SAP implementations to respond (in particular, NC State would be ideal).

Fortunately, the way we have built our timeline, we still have plenty of time to wait for their responses. The only possible issue with the interviews at this point is the accuracy and completeness of the information that we receive. We can ensure completeness by double checking our interview guide with Wayne before conducting the interviews. And hopefully any inaccuracies in data will be mitigated by the number of interviews that we are planning to conduct.

The only slowdown in our project has been Spring Break. However, we still managed to get some work done. Additionally, because we foresaw that little would get done over the vacation, we built that into the timeline, so we are still up to date.

III. Actions to be taken

All the preparation for the interviews (creation of interview template and MIT case study) has been completed. The next main step will be to conduct the external interviews. Several organizations have responded, so we will assign each team member with one or two to contact. These people will then also be responsible for putting the information

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1 Because MIT uses certificates, it is more appropriate to think in terms of single session rather than single sign-on.
into the corresponding case studies. With Spring Break behind us, our group expects to really kick into high gear with research.

In addition, we will incorporate some of the questions and suggestions from class on Tuesday, 3/29. Specifically, we will be mindful of the possible future integration with student portals. Although our champion specifically wanted us to stay away from the student portal, the point that the option should be open is valid.

To summarize, the following are our action items:
1. Get Interview guide checked off
2. Assign organizations to team members
3. Conduct external interviews

IV. Reflections and Learning
One of the main lessons from this project thus far is that depending on people and interviews for outside research can be quite time consuming. MIT students usually depend on textbooks and problems that are always readily available. Collecting information from outside sources involves quite a bit of planning and preparation.

Another lesson has been the extent to which people cling to legacy systems. Our group really has to be the unbiased perspective given that IS&T personnel assume that the new portal will be an SAP portal. There are also economic reasons for this, but the pervasiveness of legacy systems is a new experience.

Finally, our group has worked very well together through informal assignment of tasks. We trust each person to do his or her part. This trust is crucial in carrying this project forward.
MIT PORTAL PROJECT STATUS REPORT
April 14, 2005

15.568 Practical IT Management
Spring 2005

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

Sponsored by: MIT Information Systems & Technology

Provide a dashboard light of the overall prospects for achieving the project as laid out in the original project plan: green, yellow, or red

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Objectives Status
1. Determine necessary costs and resources – Green
2. Identify portal implementation issues – Green
3. Identify portal operational issues – Green
5. Create reliable documentation – Green

I. Accomplishments

1. Contacts:

SloanSpace
Julie Bergfeld
Assoc Director, Academic Comp & Web Development
Susie Lee – Made initial contact on the week of April 4, 2005.

North Carolina State University
Gwen Hazlehurst
Director of Enterprise Information Systems
Armando Valdes – Initial contact rescheduled for Wednesday, April 13, 2005.

Duke University (UPortal Open-Source)
Deborah Johnson
Assistant Vice Provost and Director of Student Administrative Services
Tiffany Kosolcharoen – Made initial contact on Friday, April 8, 2005. Tiffany received information that will be compiled this weekend (April 16) and will conduct follow-up interviews afterwards.
University of Cincinnati (SAP External Contact)
   Jim Lewis, Associate Director
   UCit Systems & Operations
   Adam Powell will make initial contact on Wednesday, April 13, 2005.

Baylor University – No contact
   Bill Bevil, CSE, Sr. Project Manager
   Baylor College of Medicine
   Bill Bevil wrote, “I will get back to you as soon as possible - we are in the process of
going live this weekend with SAP Supplier Relationship Management, SAP XI
and Enterprise Portal and a new Identity Management system.” Out of respect for
his schedule, we will not include Baylor University as part of our studies.

Central Michigan – Renae Eckland, Director of Information Technology – no response

2. Interview Template: On Friday, April 1, Wayne Turner met with Tiffany Kosolcharoen to
receive official approval for the document. Please scroll below to view the attached external
interview questions.

3. MIT Case Study: The MIT case study is pending approval. Wayne Turner provided initial
suggestions to Adam Powell to create an updated version of the case study. Wayne and
Adam will meet again to revise the MIT case study.

4. Meeting with Professor Gibson and Evan Mamas
   On Tuesday, April 5, Susie, Adam and Tiffany met with Professor Gibson and Evan
   Mamas. We learned to apply our case studies and class findings to our report.
   Specifically:
   1. Include the Baxter University case study in our findings – The Harvard
   Business School created a three-part case study of the Baxter University IT
   change management process. Through multiple class discussions, the insights
   generated from the ADP case will provide a solid example of the importance
   of human organizations in IT systems implementation.
   2. Matrix – Drawing from the many frameworks we learned in class, Professor
   Gibson and Evan Mamas recommended we used matrices (like the Gibson
   matrix) to represent our findings. We will take this advice in creating our
   final report.

II. Issues

1. SAP Portal Universities
   As of April 14, 2005 (upon due date of this status report), we are in contact with one SAP
   Portal university – the University of Cincinnati. The other university contacts have failed to
   reply.
   Therefore, our team will continue to research our successful external contacts and create
   a strong University of Cincinnati SAP Portal report.

2. Time
With the final report due in less than twenty days, the ability to establish new contact is very limited. Scheduling the initial interviews already created a two-week challenge to coordinate with others’ schedules and time zones.

Therefore, our team will leverage in-class resources (readings, websites, databases, frameworks) to strengthen our recommendations. Please see the actions to be taken below.

3. **Team coordination**

   Although it is only a minor issue, Susie, Adam, and Tiffany have taken the majority of the initiative in writing reports, emailing contacts, editing our teammates’ feedback, etc.

   Armando’s inconsistent attendance makes it challenging to share ideas and apply lessons learned to our recommendations.

   On a positive note, Armando is quick to respond by email. However, it is difficult to correspond and assign deliverables to a teammate solely via email.

### III. Actions to be taken

1. Conduct external interviews (please see above ‘Accomplishments’)

2. Write up case studies
   
   On April 20, after Patriot’s Day weekend, our full team will have conducted the interviews and written initial case studies. We will re-contact the schools to clarify, edit, and add information to the external case studies.

3. Incorporate lessons learned from class

   With guest lecturer Professor Malone’s Project Handbook as an excellent resource for prior case studies, our team will incorporate research from the online database to be included as part of our studies. In addition, our prior matrix readings and frameworks will be used in creating our final recommendation report.

### IV. Reflections and Learning

In conducting our external interviews, we have had to deal with unresponsive external contacts. People are busy, and it takes effort on both sides to establish contact.

We are pleased with the enthusiasm of our successful external contacts. We have had the privilege of meeting some of the most enthusiastic IT directors and executives of external universities’ portals, and their passion for the portal clearly is a reason for their teams’ success.

Finally, our group has created unofficial “roles” for each person. We never assigned duties for everyone, but each person has found his / her part in the team. Through the small group setting of our class, we each understand our teammates’ strengths and draw upon them in assigning deliverables.

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15.568 Practical Information Management
MIT Portal Team

**External Interview Template**

University Name: ____________________________________

Date: ____________________________________

MIT Portal Team Interviewer Names: ____________________________________

External University Contact Information: ____________________________________

P

**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
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 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

---

1 Because MIT uses certificates, it is more appropriate to think in terms of single session rather than single sign-on.
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
  - 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
MIT PORTAL PROJECT STATUS REPORT  
April 28, 2005

15.568 Practical IT Management  
Spring 2005

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

Sponsored by: MIT Information Systems & Technology

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Objectives Status
1. Determine necessary costs and resources – Green
2. Identify portal implementation issues – Green
3. Identify portal operational issues – Green
5. Create reliable documentation – Green

I. Accomplishments

1. Contacts:

SloanSpace
Julie Bergfeld – unresponsive
Deirdre Kane
Thanks to Evan’s contact, Susie successfully scheduled an interview with Deirdre.

North Carolina State University
Gwen Hazlehurst
Director of Enterprise Information Systems
Adam Powell made contact on Wednesday, April 13, 2005.

Duke University (UPortal Open-Source)
Deborah Johnson
Assistant Vice Provost and Director of Student Administrative Services
Tiffany Kosolcharoen – Made contact on Friday, April 8, 2005. Tiffany received information, including a 20-page report, that has been compiled into a case.
University of Cincinnati (SAP External Contact)
   Jim Lewis, Associate Director
   UCit Systems & Operations
   Armando Valdes – Followed-through with interview transcript. Tiffany is following-up with Jim Lewis, requesting additional materials regarding their organization, strategy, and SAP systems, and writing a report.

Baylor University – No contact
   Bill Bevil, CSE, Sr. Project Manager
   Baylor College of Medicine
   Bill Bevil wrote, “I will get back to soon as possible - we are in the process of going live this weekend with SAP Supplier Relationship Management, SAP XI and Enterprise Portal and a new Identity Management system.” Out of respect for his schedule, we will not include Baylor University as part of our studies.

Central Michigan – Renae Eckland, Director of Information Technology – no response

2. MIT Case Study: The MIT case study is attached below. It is in its final editing stages.
3. SAP – University of Cincinnati case study that Armando covered is now being covered by Tiffany.
4. Presentation: Started the presentation outline (see below).
5. Presentation Invitations: Invited IS&T contacts to our May 5 presentation.

II. Issues

1. Team member leaves
   With the departure of Armando Valdes, our team needed to restructure and divide our work. In addition to his transcript of the interview, we need to follow-up to find official information regarding the SAP Portal of the University of Cincinnati.
   For the IS&T team, the University of Cincinnati study is the most important because of its SAP relevance. It is unfortunate that our team member with this information has departed.

2. Time
   We will no longer research additional external schools. As shared in class with the other teams, our top priority is to make recommendations and provide areas for future investigation.
   Therefore, our team will leverage in-class resources (readings, websites, databases, frameworks) to strengthen our recommendations. Please see the actions to be taken below.

III. Actions to be taken

1. Create a case study from Armando’s North Carolina State University.
Tiffany is reinitiating contact with Jim Lewis to obtain information regarding the school’s SAP Portal implementation. This SAP due diligence is critical to MIT’s SAP portal success.

2. **Compile the report with all four case studies.**
   - Adam: MIT Case Study, North Carolina State University
   - Tiffany: Duke University, University of Cincinnati
   - Susie: MIT Server

3. **Make recommendations based on frameworks and readings from the class.**
   The report is outlined with the following parts:
   - Executive Summary
   - Introduction
   - MIT Portal Objective / Background
   - Cases: Duke, NC State, U of Cincinnati, MIT Server
   - Recommendations using frameworks and readings
   - Appendix

4. **Create a PowerPoint Presentation.**
   Susie has outlined the presentation, similar to the report recommendation above.

IV. **Reflections and Learning**

   It is better to admit room for improvement than to feign strength. Our report will be written realistically, and offer areas for follow-through. We will not offer a panacea “cure-all” prescription, but rather point out specific areas that our contacts found were areas for improvement.

   Rise to the occasion. It is the end of the school year, and maintaining momentum in a team that has lost a team member is difficult. We have volunteered to take on extra status reports, case studies, and presentations. It is very hard work, but it strengthens our MIT work ethic.

VI. **Project Timeline**

<table>
<thead>
<tr>
<th>Deliverables</th>
<th>Date Due</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Plan</td>
<td>W 3/2</td>
<td>3-page initial proposal</td>
</tr>
<tr>
<td>Status Report</td>
<td>R 3/17</td>
<td>2-page update of project progress</td>
</tr>
<tr>
<td>Status Report</td>
<td>R 3/31</td>
<td>2-page update of project progress</td>
</tr>
<tr>
<td>Status Report</td>
<td>R 4/14</td>
<td>2-page update of project progress</td>
</tr>
<tr>
<td>Status Report</td>
<td>R 4/28</td>
<td>2-page update of project progress</td>
</tr>
<tr>
<td>Project Presentation</td>
<td>R 5/3</td>
<td>Presentation either on 5/3 or 5/5</td>
</tr>
<tr>
<td>Report</td>
<td>R 5/5</td>
<td>20-page final report</td>
</tr>
<tr>
<td>Internal Interviews</td>
<td>W 3/16</td>
<td>Interviews with UI, Architect, PR, MIT employees</td>
</tr>
<tr>
<td>External Interview Template</td>
<td>W 3/30</td>
<td>Questions to interview non-MIT university portal administrators</td>
</tr>
<tr>
<td>External Interview Completion</td>
<td>W 4/13</td>
<td>non-MIT university portal administrators all interviewed</td>
</tr>
<tr>
<td>External Interview Write-ups</td>
<td>T 4/26</td>
<td>“Case-study”-like summaries of portal implementations</td>
</tr>
<tr>
<td>Pick Interview Candidates</td>
<td>W 3/16</td>
<td>Work with Steve Landry to select interviewees</td>
</tr>
<tr>
<td>Meeting with Wayne, Steve, Kevin</td>
<td>W 3/16</td>
<td>Status report Meeting</td>
</tr>
</tbody>
</table>
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**

Administrative Computing (AD) is a group within IS&T that exclusively handles IT issues related to administrative functions, such as payroll, benefits management, and employee data management. AD has a dedicated staff of managers and developers that work towards fulfilling MIT's needs. When an IT solution is requested, the request is prioritized. Then, the staff implements 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, have been around for several years. Within MIT, notable preexisting portals include MIT Server, 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 have portals. Table A contains a list of institutional portals.
Table A: Institutions and their Corresponding Portals

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

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\(^1\) 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 is a great amount of flexibility
in choosing a platform, as MIT already owns the licenses necessary to use SAP. Thus,
primary technical factors are driving whether the gateway should be built with SAP or an
alternative technology.

**Division Operations**

The overall strategy of AD is to build software requested by departments within MIT
using internal staff. As AD has a fixed amount of Full Time Equivalents (FTEs), its
ability to complete projects is primarily constrained by its manpower. Projects are pitched
to AD, and then are assigned a priority for completion. During the planning phase that
has occurred thus far, the gateway project has had less than one FTE allocated to it. Thus,
a larger team will have to be constructed during the implementation phase. As
development resources are limited, projects are designed so that their outcomes will
hopefully last for at least five years. Maintaining systems on this time horizon simplify
the lives of users, as the users must incur a time cost to learn the system every time the
system is changed.

---

\(^1\) Because MIT uses certificates, it is more appropriate to think in terms of single session rather than single
sign-on.
When AD builds websites and gateways, it essential that they have the MIT “look and feel”, and are able to operate well in the MIT environment. Thus, packaged software products without customizable user interfaces are less desirable. The MIT environment consists of a relatively heterogeneous set of computers and browsers. It is expected that a significant number of users will be using Microsoft Internet Explorer, Mozilla Firefox, and Apple Safari, as well as an assortment of other browsers. Therefore, it is essential that the gateway solution comply with W3C standards.

Likewise, it is essential that the interface of the gateway be internally consistent. The administrative services gateway that is currently in place, SAPweb, was originally organized around tabs that were functional groupings, such as “Purchasing”, and “Accounting”. Due to departmental demands, there has subsequently been the addition of tabs that have departmental, rather than functional titles. (See Appendix Exhibits 1 & 2) In the redesign process, it is 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 is to simplify the user experience by only providing the user with features pertinent to their position. Users of the new gateway, insideMIT, are categorized into three categories: faculty and students, accounting officers, and general users. Using certificates, insideMIT should automatically recognize the category that a user is in, and then show them the appropriate features. Additionally, users will be able to customize the features they are shown in subsequent logins, so that the gateway best suits their needs. In order to achieve this, the old static HTML gateway will 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 are 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 is 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 is taking a total redesign approach towards the insideMIT gateway. As development resources are limited, it is 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 will 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 are several technical issues associated with the gateway project. The gateway will involve two technologies that are currently unfamiliar to the Administrative Computing development team; Web Application Server (WAS), and Java 2 Enterprise Edition (J2EE). The rollout for these systems, and the corresponding “skilling”, is to correspond to the schedule designated for new payroll applications, which are also to use WAS. This means that the rollout of insideMIT can occur no later than January 2006. Luckily, human resources allocations will not need to be changed to implement this project, as there is already a redesign of the SAPwebss system scheduled, which this project would supersede. It is believed that the team of developers currently assigned to the redesign of the SAPwebss system is adequate for implementing insideMIT.

WAS may be implemented with a version of SAP R/3 that is 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 must be verified that this is still the case.

Additionally, all of the groundwork done for insideMIT has been conducted by a web development team within Administrative Computing, as well as a group of undergraduates within the Sloan School of Management. It will be necessary to have someone with project management experience to define analyst and project management roles for insideMIT before its implementation.
Exhibit 1: Current SAPweb Design

Transactions
- View/Update Labs and Other Room Sets

Look-ups
- Look Up a Person
- Report on Training
- Display Rules for Training Requirements

What can I do of?
- Facilities Request Form
- Facilities Repair Status

You can connect to Environment, Health, and Safety web applications to data for your department.

Resources:
- The EHS Management System
- The Environment @ MIT

Business support hours: Daily from 8:00am to 8:00pm EST.
Exhibit 2: Current SAPwebss (Self Service) Design

What is Self Service: Benefits?

**Self Service: Benefits** is designed to offer you the flexibility and convenience of using the web to manage your MIT benefits in one place, at the same time. Each feature is described below.

**About Benefits Enrollment**
For **newly eligible faculty and staff only**: Click on Benefits Enrollment to enroll in MIT benefits for the first time.

**About View Your Benefits**
For **all eligible faculty and staff**: Click on View Your Benefits to see your MIT benefits in which you are enrolled.

**About Tuition Assistance (TA)**
For all eligible faculty and staff: Click on Tuition Assistance Account to submit an online reimbursement request or to check the status of your reimbursement requests. Click on the [HR Tuition Assistance Home Page](#) for a description of TA services and programs, eligibility requirements, and application procedures.

**About Fidelity netBenefits 401(k) Account**
For all eligible faculty and staff: Click on Fidelity netBenefits 401(k) Account to enroll in or review your existing MIT 401(k) plan on Fidelity's web site.
Exhibit 4: Open and Restricted Content on the insideMIT Portal

<table>
<thead>
<tr>
<th>Open Content</th>
<th>Restricted Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull from existing MIT content:</td>
<td>MIT TechTime, MIT WebMail</td>
</tr>
<tr>
<td>• News office headlines</td>
<td>Purchasing, Accounting, Facilities, EHS, Reporting</td>
</tr>
<tr>
<td>• MIT Spotlight</td>
<td>Personal Info, Benefits, Training, Money Matters</td>
</tr>
<tr>
<td>• MIT directory search</td>
<td></td>
</tr>
<tr>
<td>• Google search</td>
<td></td>
</tr>
<tr>
<td>Link to:</td>
<td></td>
</tr>
<tr>
<td>• Productivity applications</td>
<td></td>
</tr>
<tr>
<td>• SAPweb applications</td>
<td></td>
</tr>
<tr>
<td>• Self service applications</td>
<td></td>
</tr>
<tr>
<td>• Events calendars</td>
<td></td>
</tr>
</tbody>
</table>

Exhibit 5: Mockup of insideMIT Portal

(Material on subsequent pages)
Bibliography


“Administrative Intranet Migration”, Steve Landry et al., 10 September 2004. (Internal)

“Effective University Portals: Evaluation of Departmental Participation, Content, and Features”, MIT Information Servi
PROJECT PLAN OUTLINE

Begin with project title, sponsor organization name, name and contact address (email and phone) for organization contact, names and contact information for team members.

I. Context for the Project

A narrative of the relevant environment (economic, technological, political, etc.), industry context, and business (MIT) strategy, objectives, issues or problems, and history of efforts that have led to the MIT IS project of interest here and to this particular 15.568 project.

II. Purpose, Objectives and Approach of the Project

**Purpose**: Overall, one-to three sentence statement of why the project is being done and what the project will do for the organization. (Similar to project "Goal" in Randolph & Posner)

**Objectives**: Three to five statements of the things that will be done to achieve the Purpose. The objectives set the scope of the project: make clear what is and is not included.

III. Tasks, Milestones, and Deliverables

A list of specific tasks, who is to do them and be contacted for them, the hours required for all individuals involved, key milestone dates for accomplishment of tasks or parts thereof, and concrete deliverables, where applicable.

Typical tasks are:
1) Plan development and approval
2) Literature or document search and review,
3) Field data gathering (such as interviews in person or by phone, survey by phone or questionnaire, etc.)
4) Analysis and preliminary conclusions
5) Presentation by team (must include the representative from the organization, either in person or via video or teleconference)
6) Final report (include outline of report)

IV. Uncertainties, Risks and Opportunities, and Planned Responses

List the degree and nature of events that have some likelihood of occurring that would have significant negative or positive impact on completion of the project. (See DeMeyer et al, and also the Project Management Body of Knowledge manual.) State what is to be done prior to and if the events occur.

V. Critical Success Factors

Three (minimum) to six or more things which must go right for the project to succeed, and a statement of how it will be assured that they do go right.

(eg, “It is critical for the success of this project that the team gain access for interviews with the administrators targeted in task x, and that the data from these interviews be completed no later than March 21. Should this appear not to be happening, the team would ask the professor, TA, or MIT IS&T sponsor for assistance in getting access or substituting interviewees.”)

VI. GANTT Chart of tasks, milestones and deliverables; include scheduled status reports and meetings with TA and/or professor.

17 Feb 05
15.568 S05

PROJECT STATUS REPORT OUTLINE

Give title of project, date of report, names of team members.

Provide a dashboard light of the overall prospects for achieving the project as laid out in the original project plan: green, yellow, or red

I. Accomplishments

Since the last report, list the significant accomplishments, not just activities but a mention of the value delivered or obtained. Mention any positive opportunities that have arisen.

II. Issues

List and explain the barriers or problems that have arisen since the last report. Explain these in terms of the uncertainties and risks as outlined.

III. Actions to be taken

List all specific action steps to be taken, other than those contained in the latest project plan revision, to take advantage of new opportunities or deal with new issues. State these actions in terms of tasks, milestones and deliverables. Indicate modifications to most recent tasks, etc.

IV. Reflections and Learning

Use this to report on how this project or the larger IS&T project have relevance to the latest completed topic module in 15.568. Also, beyond that, step back from project work and reflect on what you and the team are learning. Include particularly more or less personal surprises and challenges that were unexpected.

17 Feb 05
Suggested Presentation Outline

I. Introduction and overview
   A. (title slide) Opening
      
      Brief, welcome audience, thank sponsor(s), introduce team
   
   B. Overview statement of project IMPORTANCE and primary bottom-line conclusion or recommendation

II. Purpose, Objectives and Scope

IV. Approach and Methodology
   This sections should cover what you initially planned to do and how. If however there were any changes in your project plan please briefly cover how the changes affected your approach and methodology.

V. Findings
   Statements of fact from the literature or data; carefully not stated as conclusions or opinion or inference.

VI. Analysis and Conclusions
   Inference, results of numerical analysis of findings, generalizations from findings. Should reflect uncertainties where the data/findings are not sufficient to support strong definitive statements. Hypotheses where possible to make them and no conclusive statements can be made.

VII. Recommendations and Next Steps
   Distinctive, clear statements of action to be taken. Begin every recommendation with an action verb form, EG: "Assign...", "Take immediate steps to...", "Conduct further study before proceeding to...", etc.

VIII. Summary Message and Observations
   As part of the observations make sure to include a slide with lessons learned in terms of IT management. In other words, if you were to repeat the project but this time as the manager of the team what would you do differently and why?

IX. Questions and Comments
Make sure you have extra slides with supporting material that will help you in handling some of the questions.
Outdoor Wireless at MIT

FINAL REPORT
May 12, 2005

Team Wireless
Outdoor Wireless at MIT

Janice Lin, Jessica So, Ashvini Thammaiah, Harel Williams
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I. IS&T Project Introduction

Background
As the academic year comes to an end, IS&T’s goal of having wireless network connectivity in all indoor locations on campus, including but not limited to, dormitories, labs, as well as classrooms, has almost been entirely realized. While IS&T took steps over the past two years towards accomplishing this goal, they began to notice that quite a number of community members were accessing the MIT network via wireless signal bleeding from indoor access points to outdoor locations; people did not want to be constrained by the indoors when wanting to access the Internet.

Thus a new vision for IS&T was born: an entirely wireless MIT campus, where wireless Internet connectivity was available from one end of campus to the other, indoor as well as outdoor.

Objective
IS&T is quite aware that a complete campus-wide wireless connectivity implementation is quite a laudable goal, and will indeed take some time. However, IS&T acknowledged that MIT needs to be on the forefront of technology and communications, and thus decided to begin with a pilot program to begin during the summer of 2005.

From initial observations on IS&T’s part combined with a dose of commonsense IS&T has picked three locations in which to deploy the pilot programs:
- Student Center Steps and Surrounding Area
- Killian Court
- Stata Center Atrium and Surround Area

Based on lessons learned from the pilot, IS&T plans to incrementally deploy wireless connectivity in other outside key locations until every area on campus is covered. The speed at which this vision will be realized has yet to be determined, and will be heavily influenced by the success of the pilot as well as feedback from the community.

The goal of an entirely wireless campus is to provide MIT community members the ability to continuously and consistently access the network through mobile devices such as laptops and PDAs as they move across campus. The ability to access the Internet anywhere on campus, whether indoors and outdoors, not only increases flexibility in work style and improves efficiency, but allows computer users previously restricted to the indoors to get out and work in a more healthy and open atmosphere: the great outdoors. This becomes even more important as wireless devices begin to proliferate the consumer market and become more important to the way we work.

Deliverables
Short term: Pilot Plan, Summer of 2005
Long-term: Campus-wide Implementation, September 2005 - ?
II. Team Wireless Project Introduction

Background
In the Spring of 2005, student teams in the 15.568 Practical IT Management class were paired up with current IS&T projects and asked to play a role in assisting the IS&T project. Team Wireless was matched with IS&T’s project for the implementation of outdoor wireless internet connection. The Team met with Project Champion Theresa Regan, MIT’s Director of Operations & Infrastructure Services, and discussed the scope and goals of this student project.

Objective
IS&T’s large scale project involves numerous components. To better evaluate the situation and environment in which IS&T is launching outdoor wireless, it needs information from many ends, such as what kind of technology is available, which vendor is most appropriate for MIT, what kind of special environmental considerations (weather and architecture) do we need, etc.

Team Wireless’ role is to address two of these areas. Specifically, we will provide IS&T with relevant information regarding
- The future of wireless technology
- Other current outdoor wireless implementations

To accomplish this, we will conduct research on two ends
- Outdoor Wireless Technology
  - Research outdoor wireless technology
  - Interview vendors
- Environment for Implementation
  - Interview universities

IS&T’s Outdoor Wireless project wished to understand the future of outdoor wireless, such as which standards are used and what new technologies are being developed, so that upcoming implementations would not soon become obsolete. We would gain understanding about future technology through academic research and through interviewing vendors on what they foresee on the horizon.

Many implementation issues can be planned for by observing other current outdoor wireless implementations and learned from their experiences. Therefore, Team Wireless will interview other universities which have implemented outdoor wireless.

We will bring outside information to the inside without knowing the intimate details of IS&T’s plans. We will add value to the IS&T project by informing and supplementing them with the results of our research. The MIT Process Handbook aims to collect information on all different types of business processes so when one has questions regarding a specific kind of process, he can look up that process and see how others have previously dealt with that process. Similarly, the information we gather will serve as a base for IS&T so when they are implementing outdoor wireless...
wireless, they can reference to our report and find useful information, such as what other universities chose for their vendors or how other universities solved problems regarding architectural obstructions of signals.

**Deliverables**

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Plan</td>
<td>March 3, 2005</td>
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<tr>
<td>Status Report</td>
<td>March 17, 2005</td>
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<tr>
<td>Status Report</td>
<td>March 31, 2005</td>
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<tr>
<td>Status Report</td>
<td>April 14, 2005</td>
</tr>
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<td>Status Report</td>
<td>April 28, 2005</td>
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<tr>
<td>Project Presentation</td>
<td>May 3, 2005</td>
</tr>
<tr>
<td>Final Written Report</td>
<td>May 12, 2005</td>
</tr>
</tbody>
</table>

This final written report gathers all our findings and summarizes what we have accomplished within the timeframe provided for this project. We all provide many suggestions on where IS&T should go from here, and what special considerations they need in moving forward.

For a more detailed timeline of our project, please refer to our Gantt chart in Appendix A. The Gantt chart was adopted as recommended in Randolph and Poerner’s “What Every Manager Needs to Know about Project Management”.

www.onlineeducation.bharatsevaksamaj.net   www.bsskillmission.in
www.bsscommunitycollege.in   www.bssnewgeneration.in   www.bsslifeskillscollege.in
III. Technology Overview

Wireless Basics
Wireless network connectivity has finally become main-stream and it is difficult these days to purchase a laptop that doesn’t come equipped with the necessary hardware to harness the power of wireless. It is important to understand some of the basic concepts of how wireless works as well as certain technological terms that are used throughout this report. Therefore, we are going to walk through a communication between an MIT student using a wireless laptop on the Student Center steps and a professor using a desktop in his office, as illustrated in figure 1.

![Figure 1: Wireless Basics](image)

The student with the laptop attempts to send a message to his professor. First, the computer converts the message to its digital format to be stored temporarily on the computer. Then, the wireless card in the laptop takes that digital information and converts it to a radio signal that is sent out into the air, the be picked up by the associated access point. This access point is connected to the wired MIT network which is, in turn, connected to the rest of the internet.

Once the access point receives the signal sent from the laptop, it takes it and converts the radio signal back into its digital form and sends it along to the appropriate switches on the network, which eventually makes its way to the professor’s desktop computer.

Wireless Bridges
Another important wireless feature to understand is that of wireless bridges. Basically, wireless bridges allow a service provider to extend the range of a wireless signal by bouncing signals off of multiple access points configured to be wireless bridges.
To illustrate the use of wireless bridges, please refer to figure 2. Let’s say that the student with the wireless laptop is in the middle of Briggs field with his laptop, and the distance between his laptop and the access point mounted on the outside of Simmons Hall is farther than the wireless signal is able to travel. However, there is a wireless bridge in the middle of the field which is configured to take signals sent to it and send it out farther in certain directions, thus enabling a signal from the laptop to reach the access point at Simmons and vice versa.

**Wireless Standards**

Today, the most widely used standards are the 802.11a/b/g protocols. While a and g are the faster protocols, b and g are interchangeable and are composed of cheaper hardware. Additionally, the range on the b and g protocols are somewhat farther than the a protocol. Currently, g is considered the gold standard, being the fastest most-widely used protocol available today.

**Future Wireless Technologies and Standards**

There are a number of new protocols on the horizon. 802.16, also known as Wi-Max, is a protocol that hopes to extend the distance of wireless signals to 10-20 miles, thus providing “Last Mile Broadband Connections” to consumers who cannot connect to a wired solution for fast Internet connections. In the near future IS&T does not have to worry about this new technology much because the wired infrastructure is already implemented on campus and should be utilized to its fullest potential. However, in the far future the current wired infrastructure could become fully saturated, thus opening the doors to new technologies that provide additional bandwidth to users on campus through other means than buried wires.
802.11n is basically a step up from the 802.11g protocol, providing double the throughput. However, it operates on the 40 MHz Channel, which is restricted in countries such as Europe and Japan. Therefore, standard adoption is not likely in the coming years until these important countries change their policies.

802.11i is a wireless protocol that provides more secure wireless communications. At the present time, all wireless implementations on campus are un-encrypted and therefore this protocol may not be of much interest to IS&T. However, with the potential extension of wireless connectivity to public areas like Massachusetts Avenue and Kendal Square, IS&T might want to consider enhanced encrypted wireless communications with this new protocol.
IV. Vendor Research

Procedure

1. Inquire Project Champion for MIT’s current indoor wireless vendors
2. Research on-line for outdoor wireless vendors
3. Contact vendors with list of specific questions (phone & e-mail)
4. Compile analyze results
5. Make recommendation

The list of specific questions asked to vendors includes the following:

- What solution do you offer for outdoor wireless internet access? What kind of access points is used?
- MIT’s current wireless network has a central remote management system where individual computer connections can be shut down from this central system if problems arise. How will your access points be able to blend in with our current system?
- What are some qualities that make you a strong candidate for MIT to choose as a vendor?
- Do you have experience with implementing outdoor wireless internet on college campuses?
- What is your pricing and how does it compare to competitors?
- What do you see as the future trend of outdoor wireless technology?
**Information & Comparison**

**Vendors contacted:**
Enterasys, Avaya, smartBridges, D-Link, InPath Devices, National DataComm Corporation, Lucent, Cisco, 3Com, Symbol, Proxim, NetGear, and Firetide
* For contact information of these companies, please see References.

Enterasys and Avaya are MIT’s current vendors for indoor wireless. Unfortunately, Entersys’ outdoor wireless solutions are discontinued, and we were unable to get in contact with Avaya.

**Vendors who cooperated with the project:**
smartBridges, D-Link, InPath Devices

<table>
<thead>
<tr>
<th>Outdoor Wireless Solution</th>
<th>smartBridges</th>
<th>D-Link</th>
<th>InPath Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>airBridge and airPoint PRO series</td>
<td>DWL-1700 AirPremier Outdoor 2.4 GHz Wireless Access Point</td>
<td>CPE 2473 Wireless Bridge</td>
</tr>
<tr>
<td>Pricing</td>
<td>$350 each</td>
<td>$820 each</td>
<td>$379 each</td>
</tr>
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<td>Standard Used</td>
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<td>802.11 a/b/g</td>
<td>802.11 b</td>
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<tr>
<td>Experience with Universities</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Compatible with MIT’s Current Wireless Network</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Vendor**

**Key Advantages**

**D-Link**
- Extreme weather protection
  - built in heater and temperature sensor, Watertight Aluminum housing, Lightning Protection, and PoE (Power Over Ethernet)
- Quality name brand
- 128-bit WEP encryption
- IEEE 802.1x port-based network access control with RADIUS servers for user authentication

**InPath**
- Easy installation - integrated radio and antenna
- Low price – Cisco uses same OEM but much more expensive

**smartBridges**
- Experience in all areas (Low power, commercial, wide areas, high humidity, below zero temperatures, outside city limits, revenue generation, residential)
- Remote management system
- Supports VoIP
**Vendor Recommendation**

As Team Wireless was only able to receive full response from 3 vendors, we are still in an early phase of evaluating vendors; therefore, we cannot tell IS&T exactly which vendor to work with. However, of the 3 vendors, we can draw a preliminary conclusion of which vendor we would prefer out of these three.

<table>
<thead>
<tr>
<th>Future Trends</th>
<th>Compatibility with MIT</th>
<th>Weather duration</th>
<th>Experience in installation</th>
<th>Advanced technology</th>
</tr>
</thead>
</table>

- **Lower price range**
  - **smartBridges**

- **Higher price range**
  - **D-Link**

Considering future trends of technology, compatibility with MIT, weather duration, experience in installation, and advanced technology, we recommend that:

1) If MIT is aiming for a lower price range and looking for a more economical solution, to work with smartBridges, and

2) If MIT is fine with a higher price range and wants to go with a more established and more brand-name vendor, to work with D-Link.
Next Steps for Vendor Research

- Interview more vendors
  - Speaking with vendors can help better understand options for technology and support.
  - As a student project group, we had limited contacts. We are confident that vendors would be much more willing to work with MIT’s IS&T.

- Allow vendors to evaluate MIT’s specific circumstances
  - When speaking to vendors, they often asked specific questions about MIT’s current systems and environment. By allowing vendors to identify unique attributes of MIT, IS&T will be able to evaluate how vendors will handle these circumstances.

- Bring vendors on campus to give price quotes
  - This will allow IS&T to conduct a price-benefit analysis on different vendors.
  - Bringing the vendors on campus to present their best solution and bid for the project will hopefully make it more cost-efficient for MIT.

- Research retail channels
  - Certain vendors actually use retailers to sell their products.
  - IS&T should evaluate purchasing options and see which channel will provide the best future support, since IS&T is relying on the vendor to provide future support and maintenance of the outdoor wireless.
V. University Research

Procedure

1. Research on-line for universities with outdoor wireless technologies
2. Contact universities through email correspondence with a list of specific questions
3. Compile and display information
4. Make preliminary recommendations
5. Suggest next steps

Since IS&T would use our research on universities as a reference to MIT’s outdoor wireless implementation, we thought the most relevant questions would fit under the following three categories: vendor selection, implementation process, and other considerations. All of the questions were derived from the interests of our Project Champion.

- **Vendor Selection**
  - Whom did you choose as your vendor?
  - What criteria did you set forth in order to select the vendor?

- **Implementation Process**
  - What is the outdoor wireless infrastructure of your campus?
  - How long did the implementation take?
  - What were some of the implementation problems you experienced, if any?
  - How has the weather affected outdoor wireless functionality?
  - How did you take into account structural interference?

- **Other Considerations**
  - Are there items you wish you knew before you started the implementation?
  - How does the university cope with visitors on campus who use the wireless technology?

Due to time and resource constraints, we used a static email interview structure. The information collected from the interviews can give IS&T a snapshot into how other universities use their technology. For a deeper information, personal or phone interviews should be conducted in the future to obtain more specific information that could be relevant to MIT’s implementation.
Information & Comparison

Team Wireless contacted seventeen universities through email asking questions ranging from vendor selection to infrastructure set-up. Our team tried to specifically research universities in the Boston and northeast area in order to understand how others dealt with similar weather and campus challenges. Unfortunately, the only universities we could find are similar to MIT externally (weather conditions) and internally (integrated campus and city) were Carnegie Mellon University, Columbia University, University of Pennsylvania, and University of Pittsburgh. In general, the locations of outdoor wireless campuses are sporadic in geographic location. Since we could find limited amount of universities that have implemented this technology, team wireless believes that MIT would still be a pioneer in this technological movement.

Universities Contacted
Bowling Green State University, Carnegie Mellon University, Central Washington University, Columbia University, Drew University, Georgia Institute of Technology, Goucher University, Florida A&M University, Louisiana State University, University of Arkansas, University of California, Irvine, University of Iowa, University of Nevada, Reno, University of Pennsylvania, University of Pittsburgh, University of South Carolina, and University of Virginia
*For contact information of these universities, please see References.

Universities who cooperated with the project:
Carnegie Mellon University, Columbia University, Georgia Institute of Technology, Louisiana State University, and University of Virginia

The following chart aggregates the important university data.

<table>
<thead>
<tr>
<th>University</th>
<th>Vendor</th>
<th>Infrastructure</th>
<th>Weather</th>
<th>Visitor Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie Mellon University</td>
<td>AT&amp;T (currently Proxim)</td>
<td>Internal Bleeding + External Antennas</td>
<td>Irrelevant</td>
<td>Guest Registration: access to only internet</td>
</tr>
<tr>
<td>Columbia University</td>
<td>Lucent (currently Proxim)</td>
<td>External Antennas</td>
<td>Irrelevant</td>
<td>Guest Registration: access to only internet</td>
</tr>
<tr>
<td>Georgia Institute of Technology</td>
<td>Digital Atlantic (currently Proxim)</td>
<td>Outdoor Switches</td>
<td>Irrelevant</td>
<td>No non-authenticated wireless networks</td>
</tr>
<tr>
<td>Louisiana State University</td>
<td>Cisco</td>
<td>External Antennas</td>
<td>None</td>
<td>Guest Registration: access to only internet</td>
</tr>
<tr>
<td>University of Virginia</td>
<td>Cisco Aironet</td>
<td>Bridge Antennas</td>
<td>None</td>
<td>No non-authenticated wireless networks</td>
</tr>
</tbody>
</table>
Vendor
Each university chose a different vendor at the time of purchase. Each university identified potential vendors and worked together to devise customized solutions for its campus. We recommend that MIT follow a similar procedure for vendor selection.
* Refer to the Vendor Research section for more information.

Infrastructure
The three main technologies that the universities currently have in place are external antennas, bridge antennas, and outdoor switches. The universities stressed how the coverage landscape dictates the type of technology needed. For example, a large open field (ie Briggs Field) needs to be covered by bridge antennas in order for the signal to reach across the open space. The collaboration between the vendor and university will determine the appropriate technology for a given space.

Weather
Since the ferocious winter months inhabit Boston for most of the year, IS&T was wondering how weather may affect the wireless signal. Fortunately, most universities found no signal degradation or irrelevant signal degradation due to the weather. In stormy weather conditions, usually there aren’t any individuals who are trying to access wireless outdoors.

Visitor Policy
Universities mainly followed two visitor policies. Georgia Institute of Technology and University of Virginia require that wireless users must register with the school. The other universities as well as MIT have a guest registration option. Specifically, MIT allows visitor use for up to fourteen consecutive days. Team wireless believes that the current policy should remain for outdoor wireless as well. The policy is flexible for individuals who stay temporarily on campus as guests of MIT. At the same time, the policy is secure because visitors only have access to the internet and not to user/password information.

The universities also shared their knowledge from the implementation of their outdoor wireless. The chart below displays an array of diverse implementation problems and solutions to structural interference.
### Implementation Problems

- **Limited RF available in the 2.4 Ghz band:**
  At the 2.4 Gz band, microwaves, cordless phones, and Bluetooth devices cause interference. The universities overcame such problems with strategic placement of access points and the use of multiple access points.

- **Mistakenly experimented with new technology:**
  Georgia Institute of Technology experimented with new technology from Digital Atlantic to cut costs and avoid laying down hard-wired ethernet. They set up the infrastructure, but the actual wireless internet did not work and the company went under. In the end, Georgia Institute of Technology had remove Digital Atlantic’s work and set up the hard-wired ethernet.

- **Antennas on historical buildings:**
  Georgia Institute of Technology had a problem with putting antennas on the steep roofs of their historical buildings, so they put a switch on top of their library to cover the whole area. In addition, historical buildings have restrictions on installing such devices. MIT might run into this issue further down the road with the campus-wide installation when covering areas by the Alumni Pool and Lobby 10.

### Solutions to Structural Interference

- **Trial & error AP placement:**
  Carnegie Mellon University used a method of placing access point at an opposite end as the rest of the access points and then moving it closer to the rest until it leaves no coverage gaps. With the additional access point, they repeated the process.

- **Design around potential obstacles:**
As stated above, Georgia Institute of Technology had a problem with putting antennas on the steep roofs of their historical buildings, so they put a switch on top of their library to cover the whole area.

- **Relocate access points:**
  The access points can be moved to increase performance level. The optimal method is the trial & error process.

- **Power up access points:**
  The strength and coverage area can be changed to accommodate structural interference.

- **Add another antenna:**
  Louisiana State University implementation plan was to set up additional antennas when and where they are needed.

Many of the issues seen at the other universities look as though they might also be problems that may arise at MIT. It would be useful to talk to the universities beforehand to have some scenario planning (Class 12 discussion on March 15: CareGroup). This will allow IS&T to prevent these issues from coming up or at least know how to handle the problems that may arise during the implementation.
Preliminary Recommendations

From the information we received, Team Wireless has developed several recommendations that MIT should consider when rolling out the Pilot Program in June.

Install access points out of sight
Access points can be easily stolen or damaged if exposed to human contact. Placing access points out of sight would lengthen the life of access points.

Deploy 802.11g technology if possible
Protocol 802.11g is currently the fastest, most widely used protocol. For the future, team wireless believes that .11g will be the pervasive protocol for outdoor wireless. Additionally, the indoor wireless protocol is .11g; therefore, choosing .11g would maintain signal consistency from indoors to outdoors.

Create site surveys
Planning for access point coverage for the desired location is imperative in order to maximize the signal given potential obstructions. Creating site surveys will ensure effective access point placement and limit the trial and error process.

Test access points by trial and error
Since each area is unique, the only way to get the best layout of access points is with the process of trial and error. Carnegie Mellon University used a method of placing access point at an opposite end as the rest of the access points and then moving it closer to the rest until it leaves no coverage gaps. With the additional access point, they repeated the process.

Add up to three access points for one area
For a given location, up to three access points should be used depending on interference types. After installing three access points, the 2.4 GHz channel becomes oversaturated and each additional access point yields diminishing marginal returns to the signal.

Use stable and flexible technology
This point of advice is to reiterate common sense. Even though Team Wireless has done its best to forecast some technological trends, there could be new enhancements or other technological advances that we may have overlooked. As such, IS&T should adopt flexible technology that can easily be modified to include upcoming technology.
Next Steps for University Research

Interview more universities regarding MIT’s specifics
Due to time and resource constraints, the static email interview structure can give IS&T a snapshot into how other universities use their technology. However, more research dynamic (ie personal or phone interviews) should be conducted in the future to obtain more specific information that could be relevant to MIT’s implementation and gather details on concerns exposed in initial research. In addition, as a student project group, we had limited contacts. From the comments we received during our final presentation, we are confident that vendors would be much more willing to speak to MIT’s IS&T. Since more research can always be helpful, IS&T should just limit itself to speaking to the five universities we interviewed in more detail in addition to speaking to any schools with a similar landscape and climate (ie University of Pennsylvania).

Gather special circumstances of implementation areas
Multiple universities stated that each area was unique and thus would have to have a custom access point layout as a result of interference (ie whiteboards, concrete buildings, and water) and area characteristics (ie how level the land is and estimated usage). Once the information is gathered, IS&T should talk to the vendors regarding how we can overcome each problem. It may be beneficial to start this early because of our unique architecture.

Understand future funding for upgrades
Depending on IS&Ts future plans and options going to be available in the future, IS&T has to weigh the advantages and disadvantages of upgrading later versus repairing new technology glitches that come up from using new technologies now. For example, Georgia Institute of Technology experimented with new technology from Digital. They set up the infrastructure, but the actual wireless internet did not work and the company went under. In the end, Georgia Institute of Technology had reverted back to the stable technology but with time and resources lost. MIT might face similar pressure to be at the leading edge, but it might be less risky for MIT to go with a more flexible plan such as Louisiana State University. They have an ongoing implementation process where they add access points when they see a need for it.

The university research done by our team is a good general stepping stone for MIT’s IS&T to build off of. With the given information in the report, we hope to give IS&T some points to focus on when moving forward with their outdoor wireless implementation.
VI. Future Considerations for IS&T

DHCP Lease Visitor Policy
IS&T’s current policy on leasing IPs to visitors on campus is to provide them full access to the network for 14 days per a given year. This policy may have worked when wireless access was restricted to indoors, but once wireless is available outdoors, especially near public areas like Massachusetts Avenue and the Kendall T Station, the MIT network will most likely receive a number of additional wireless connections from non-MIT community members.

Although IS&T has implemented an extensive remote management system for wireless Access Points and DHCP leases which enables them to deny access to specific machines connected to the network, the increase in visitors may drastically increase the load on the remote management system. Instead of bolstering the remote management system, IS&T may want to consider revising their Visitor policy, by:

- Reducing the amount of time a visitor has access
- Implement a more extensive registration process
- Limit visitors to certain ports (i.e. only allow them to browse the web)
- Monitor visitor connections more closely

Pilot Program Success Metrics
Although this question is a bit out of the scope of our project, it is important to evaluate the success of the three pilot locations for outdoor wireless deployment. One obvious way is to measure the load on the newly deployed access points. If these access points are well saturated, then the locations chosen were good ones.

Another means of determining whether the pilot program is a success is by conducting surveys before and after the deployment of the outside wireless locations gauging the satisfaction of community members with wireless connectivity. Additionally, it would be useful to see what percentage of the community is aware of the outdoor wireless availability a couple of months after deployment.

Identifying Key Outdoor Locations
IS&T must make a serious effort in determining the ideal locations for outdoor wireless and prioritize them. In determining the pilot locations, IS&T simply observed where people were using bleeding signals. For future locations, we recommend that IS&T survey the community for outdoor locations where they would find wireless access useful. IS&T should take into consideration:

- Places to sit
- Shade (most laptop screens become extremely washed out in the sun)
- Power outlets (batteries only last for so long)
Building Interference
There are a number of very unique buildings around MIT made out of special materials, such as Simmons and Stata. IS&T must figure out what affect unique building materials have on signal strength and interference, and can look at the experiences of other universities who deployed outdoors.

Future Technologies
IS&T must always be wary of future technologies that could have a profound impact on their outdoor wireless implementation, such as the introduction of new protocols that may be widely adopted. Additionally, IS&T must pay attention to the increased proliferation of wireless devices in the form of wirelessly enabled PDAs and handhelds. In the future, there may be hundreds of people with wireless handhelds passing by access points at one time; what affect will this have the wireless network? IS&T should also take advantage of the convergence of technologies, such as the advent of wireless Voice over IP (VoIP) equipment in the past couple months.
VII. Lessons Learned

The Outdoor Wireless Team enjoyed working on this project for IS&T. The project allowed us to apply what we learned in class, such as the use of Gantt Charts to keep track of deadline and the use of status signals. We also really appreciated the very important people such as Steve Winig were supportive and interested in our project. It made us feel as though they were really listening and that our work would be useful to them. However, work equivalent to the work before the project on top of status reports and other deliverables made it hard for the team to focus on the project.

![Diagram of Team Wireless Pyramid to IT Project Management Success]

Maintain clear consistent communication
It is extremely important to have proper communication between team members and with others involved in the project. As a team, we communicated well and thus we were all on the same track. However, we were not able to meet with a key stakeholder in the project and so for a little bit we were not able to move forward. Nevertheless, after meeting with the stakeholder, we were able to make up the time we lost.

Plan for more data collection than needed
Out of the fourteen vendors contacted and seventeen universities contacted, we only received information from three vendors and five universities. In addition, since the schools do not know what is pertinent to MIT, we had to filter out a lot of data. We did not plan for such a small response rate. In the beginning, we only contacted a few expecting responses from most of them. But after seeing our response rate, we contacted more vendors and universities. If we had known this and planned accordingly to gather the information earlier, we might have been able to follow up with additional questions to gather specifics regarding their responses.
Work backwards from a set goal
As Professor Gibson mentioned in class, it is important to figure out what you want in the deliverables and then work backwards to get the results you need. We did not do this initially. After our initial presentation, our team met to figure out what we wanted as our end result. If this was a larger project, a useful tool in measuring performance would be the Balanced Scorecard. It’s “a set of measures that gives top managers a fast but comprehensive view of the business” in four perspectives: financial, customer, internal business, and innovation and learning as stated in “The Balanced Scorecard – Measures that Drive Performance” by Robert S. Kaplan and David P. Norton.
VIII. References


XI. Acknowledgements

Theresa Regan (IS&T)
Director of Operations and Infrastructure Services
Theresa was our Project Champion and without her help and expertise, Team Wireless would not have been successful in our research and conclusions.

Chuck Gibson (CISR)
Senior Lecturer at the Sloan School of Management
Professor Gibson guided us at every step of the project. He gave us advice and direction that aided in our planning and execution.

Evan Mamas
Graduate Student in the department of System Design and Management
Evan critiqued our status reports and gave us suggestions on how to progress with our project.

Steven Winig (IS&T)
Sr. Proj Manager & Special Assistant to IS&T VP
Steve gave our group great perspective on how to widen our project scope to enhance our report to IS&T.

Jerry Grochow
Vice President for Information Services & Technology
Jerry commented on our presentation and gave us helpful feedback that will help us on future team projects and presentations.

15.568 class
The class asked pertinent questions that helped our team focus on the direction of our project.

Participating Universities & Vendors
The universities and vendors mentioned in this report supplemented our team with the necessary data that made this project possible.

To all of the individuals above, thank you for your time and help!
Sincerely,
Team Wireless.

Janice Lin, Jessica So, Harel Williams, Ashvini Thammaiah
XII. Appendix A: Wireless Team Project Gantt Chart

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Start</th>
<th>Finish</th>
<th>Duration</th>
<th>% Complete</th>
<th>Resources Needed</th>
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<tbody>
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XIII. Appendix B: Final Presentation Slides
Outdoor Wireless Internet at MIT

15.568
Prof. Gibson
TEAM WIRELESS
Janice Lin
Jessica So
Ashvini Thammaiah
Harel Williams

Background Technology
Overview
University Research
Vendor Research
Next Steps
Key Factors

Lessons Learned
Q & A

Background: IS&T’s Project
Context:
• MIT looking to expand wireless availability to outdoors
• Project Champion: Theresa Regan, Director of Operations & Infrastructure Services
• Motivation: provide students additional gathering locations
Objective:
• Short term: Pilot program by the end of the summer for Stratton Student Center, Stata Center, & Killian Court
• Long term: Provide wireless internet for all MIT outdoor locations

Background: Team Wireless’ Project
Context:
• IS&T looking to expand wireless availability to outdoors
• Project Champion: Theresa Regan, Director of Operations & Infrastructure Services
• Motivation: provide students additional gathering locations
Objective:
• Technology
  – Research outdoor wireless technology
  – Interview vendors
• Environment
  – Interview universities

Wireless Basics

Agenda
Wireless Bridges

Wireless Standards

• Current Standards: 802.11a/b/g
  – a: 5 GHz Band, 54 Mbps
  – b: 2.4 GHz Band, 11 Mbps
  – g: 2.4 GHz Band,

• Future Protocols
  – 802.16: “Last Mile Broadband Connections”
  – 802.11n: 5 GHz Band, 40 MHz Ch, 108 Mbps
  – 802.11i: Better security

Agenda

Research from Universities

<table>
<thead>
<tr>
<th>University</th>
<th>Implementation Problems</th>
<th>Solutions to Structural Interference</th>
</tr>
</thead>
<tbody>
<tr>
<td>UVA</td>
<td>Antennas on historical bldgs</td>
<td>Relocate, Power up, Use another antenna</td>
</tr>
<tr>
<td>Columbia</td>
<td>Limited RF available in the 2.4 GHz band</td>
<td>Design around potential obstacles</td>
</tr>
<tr>
<td>Carnegie Mellon</td>
<td>Limited RF available in the 2.4 GHz band,</td>
<td>Trial and Error of AP placement</td>
</tr>
<tr>
<td>Georgia Tech</td>
<td>Mismatched with new Technology, Antennas on</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>historical bldgs</td>
<td></td>
</tr>
<tr>
<td>Louisiana State</td>
<td>None</td>
<td>Add another antenna</td>
</tr>
</tbody>
</table>

Research from Universities

<table>
<thead>
<tr>
<th>Action</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install AP’s out of sight</td>
<td>To avoid AP damage from human tampering</td>
</tr>
<tr>
<td>Deploy for protocol 802.11g if possible</td>
<td>To benefit from the fastest, most widely used protocol</td>
</tr>
<tr>
<td>Create accurate site surveys</td>
<td>To understand how potential obstacles will affect performance</td>
</tr>
<tr>
<td>Test AP placement by trial and error</td>
<td>To optimise individual building coverage areas</td>
</tr>
<tr>
<td>Add up to 3 AP’s to cover same area</td>
<td>To minimize interference</td>
</tr>
<tr>
<td>Use stable and flexible technology</td>
<td>To prepare for better future technology</td>
</tr>
</tbody>
</table>

Lessons Learned

Q & A
Research from Vendors

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Outdoor Wireless Solution</th>
<th>Standard</th>
<th>Experience With Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-Link</td>
<td>DWL-1700 AirPremier Outdoor 2.4 GHz Wireless Access Point $850 each</td>
<td>802.11 a/b/g</td>
<td>Yes</td>
</tr>
<tr>
<td>InPath</td>
<td>CPE 2473 Wireless Bridge $379 each</td>
<td>802.11b</td>
<td>Yes</td>
</tr>
<tr>
<td>smartBridges</td>
<td>airBridge and airPoint PRO series $350 each</td>
<td>802.11b</td>
<td>(Next month will come out with 802.11 a/b/g)</td>
</tr>
</tbody>
</table>

Research from Vendors: Recommendations

- Lower price range:smartBridges
- Higher price range:D-Link

Research from Vendors:

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Key Advantages</th>
</tr>
</thead>
</table>
| D-Link     | • Extreme weather protection  
|            | • Built-in heater and temperature sensor, Watertight Aluminum housing, Lighting Protection, and PoE (Power Over Ethernet)  
|            | • Quality name brand  
|            | • 128-bit WEP encryption  
|            | • IEEE 802.1x port-based network access control with RADIUS servers for user authentication                                                  |
| InPath     | • Easy installation - integrated radio and antenna  
|            | • Low price – Cisco uses same OEM but much more expensive                                                                                      |
| smartBridges | • Experience in all areas (Low power, commercial, wide area, high humidity, below zero temperatures, outside city limits, revenue generation, residential)  
|            | • Remote management system  
|            | • Supports VoIP                                                                                                                                  |

Agenda

- Background
- Technology Overview
- University Research
- Vendor Research
- Next Steps
- Key Factors

Recommendation on Next Steps: University Research

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview more universities regarding MIT's specifics</td>
<td>To gather details on concerns exposed in initial research</td>
</tr>
<tr>
<td>Gather special circumstances of buildings</td>
<td>To conduct research on how to overcome each problem</td>
</tr>
<tr>
<td>Understand future funding for upgrades</td>
<td>To weigh upgrading later versus repairing new technology glitches</td>
</tr>
</tbody>
</table>
**Recommendation on Next Steps: Vendor Research**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview more vendors</td>
<td>To better understand options for technology and support</td>
</tr>
<tr>
<td>Allow vendors to evaluate MIT’s specific circumstances</td>
<td>To identify unique attributes of MIT and how vendors will handle them</td>
</tr>
<tr>
<td>Bring vendors on campus to give price quotes</td>
<td>To conduct cost-benefit analysis on different vendors</td>
</tr>
<tr>
<td>Research retail channels</td>
<td>To evaluate purchasing options and choose channel with best future support</td>
</tr>
</tbody>
</table>

**Key Factors to Consider for Implementation**

- DHCP Lease Visitor Policy
- Building Interference
- Popular Outdoor Locations
- Future Technologies:
  - Wireless VoIP
  - Handheld Devices

**Lessons Learned**

- Maintain clear consistent communication
- Plan for more data collection than needed
- Work backwards from a set goal

**Agenda**

- Background
- Technology Overview
- University Research
- Vendor Research
- Next Steps
- Key Factors

- Lessons Learned
- Q & A
Thank You

- Theresa Regan
- Professor Gibson
- Evan Mamas
- 15.568 class
- Steven Winig
- Participating Universities & Vendors
Outdoor Wireless at MIT

Revised Project Plan
3/10/2005

Team Wireless
Janice Lin, Jessica So, Ashvini Thammaiah, Harel Williams
Project Plan Outline

I Context for the Project

In recent years, MIT has endeavored to support a wireless campus. The IS&T division has met with success in the indoor wireless environment and is now looking to expand wireless availability to outdoors. Teresa Regan, Vice President for Information Services and Technology, communicated to our team the reasons for having an outdoor wireless system. One of the motivations is to provide additional locations where students can gather for social and academic purposes. In addition, IS&T would like to make the wireless connectivity consistent throughout campus.

The objective is to implement a pilot program by the end of the summer that provides outdoor wireless in the following three areas: Stratton Student Center, Stata Center, and Killian Court. Pending the success of the pilot program, IS&T will provide wireless internet for all other MIT outdoor locations.

Considering the scale of this project, there are various uncertainties regarding the technology and environment. Specifically for technology, IS&T would like to understand the future outdoor wireless market and the corresponding technological advances. Environmentally, concerns include durability under weather conditions, structural interference of wireless signal, and ease of construction with aesthetics in mind. IS&T is also uncertain of their vendor preference.

II Purpose, Objectives and Approach of the 15.568 Wireless Team Project

Purpose:

We plan to provide IS&T with relevant information regarding the future of wireless technology and examples of other current outdoor wireless implementations. This information will help IS&T make more informed decisions for their pilot program.

Objective:

To address the technology concerns, we will first conduct preliminary research on available outdoor wireless technology. Secondly, we will interview vendor personnel to understand the evolving wireless technology market and how its direction affects our technology choice.

With regards to the environmental concerns, we will interview other universities and ISP companies with outdoor wireless internet. From these interviews, we hope to uncover their solutions to implementation problems, their criteria for selecting vendors, and their process of implementing the infrastructure. Finally, if there is enough time, our team would like to collect some qualitative data regarding campus sentiment on the outdoor wireless initiative.
### Tasks, Milestones, and Deliverables

<table>
<thead>
<tr>
<th>Task</th>
<th>Owner</th>
<th>Hours</th>
<th>Due Date</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plan development and approval</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Submit project plan to Professor and TA</td>
<td>All</td>
<td>6</td>
<td>8-Mar</td>
<td>Project plan</td>
</tr>
<tr>
<td>Revise project plan</td>
<td>All</td>
<td>3</td>
<td>8-Mar</td>
<td></td>
</tr>
<tr>
<td><strong>Literature or document search and review</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online research for wireless technology and talk to IS&amp;T about remote access to wireless docks</td>
<td>Harel</td>
<td>3</td>
<td>15-Mar</td>
<td>Understanding of wireless technology and what vendors and schools are doing</td>
</tr>
<tr>
<td>Vendors research</td>
<td>Janice</td>
<td>3</td>
<td>15-Mar</td>
<td></td>
</tr>
<tr>
<td>Universities research</td>
<td>Ashvini, Jessica</td>
<td>3</td>
<td>15-Mar</td>
<td></td>
</tr>
<tr>
<td><strong>Field data gathering</strong> (such as interviews in person or by phone, survey by phone or questionnaire, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vendors research</td>
<td>Janice</td>
<td>5</td>
<td>5-Apr</td>
<td>Insights from vendors, ISPs, and schools on outdoor wireless technology implementation</td>
</tr>
<tr>
<td>Universities research</td>
<td>Ashvini, Jessica</td>
<td>5</td>
<td>5-Apr</td>
<td></td>
</tr>
<tr>
<td>ISPs</td>
<td>Harel</td>
<td>5</td>
<td>5-Apr</td>
<td></td>
</tr>
<tr>
<td><strong>Analysis and preliminary conclusions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vendors</td>
<td>All</td>
<td>6</td>
<td>12-Apr</td>
<td>Write-up on findings and use them to answer our objectives</td>
</tr>
<tr>
<td>Universities</td>
<td>All</td>
<td>8</td>
<td>12-Apr</td>
<td></td>
</tr>
<tr>
<td><strong>Presentation by team</strong> (must include the representative from the organization, either in person or via video or teleconference)</td>
<td></td>
<td></td>
<td></td>
<td>PowerPoint presentations</td>
</tr>
<tr>
<td>Preliminary presentation to stakeholders (IS&amp;T)</td>
<td>All</td>
<td>6</td>
<td>21-Apr</td>
<td></td>
</tr>
<tr>
<td>Revised and final presentation</td>
<td>All</td>
<td>6</td>
<td>28-Apr</td>
<td></td>
</tr>
<tr>
<td><strong>Final report (include outline of report)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete report on final conclusion to MIT IS&amp;T</td>
<td>All</td>
<td>20</td>
<td>10-May</td>
<td>Complete 20-page final report</td>
</tr>
</tbody>
</table>
## IV Uncertainties, Risks and Opportunities, and Planned Responses

<table>
<thead>
<tr>
<th>#</th>
<th>Risk Statement</th>
<th>Condition</th>
<th>Consequence</th>
<th>Probability</th>
<th>Impact</th>
<th>Exposure</th>
<th>Mitigation</th>
<th>Contingency</th>
<th>Triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Team members are overloaded</td>
<td>Poor Project Delivery</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>Weekly Meetings, Frequent Email Contact, Good Scheduling Practices</td>
<td>Redistribute tasks, Narrow Focus of Project, Redefine Objectives</td>
<td>MIT is difficult, Project scope becomes too large</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Vendors, ISPs, Colleges are unwilling to share information</td>
<td>Lack of information to provide to IS&amp;T</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>Use personal contacts of IS&amp;T, Use MIT name, Use student government angle</td>
<td>Change our objective to focus on information available</td>
<td>Unprofessional communication, Confidentiality Issues, Conflict of interest to vendors</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Team Member Conflicts/Internal Problems</td>
<td>Team atmosphere/moral degrades, Slow in project development</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>Shorter, more frequent meetings, informal hang out time</td>
<td>Intervention, team counseling sessions</td>
<td>Too much time together, Stress</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>IS&amp;T does not like presentation/report</td>
<td>Our impact is minimal</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>Update regularly with champion, dynamically adjust project to feedback</td>
<td>Create a post mortem for our findings and include recommendations for further research</td>
<td>Poor communication between champion and group</td>
<td></td>
</tr>
</tbody>
</table>
## V Critical Success Factors

<table>
<thead>
<tr>
<th>Condition</th>
<th>Success Statement</th>
<th>Consequence</th>
<th>Assurance</th>
<th>Contingency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to interviews with relevant persons</td>
<td>Relevant and effective information for our project's objectives</td>
<td></td>
<td>Tenacious, professional, and efficient in our contact methodology</td>
<td>Go through a third party (IS&amp;T, Prof. Gibson) to find personal contacts</td>
</tr>
<tr>
<td>Team Member Dedication</td>
<td>Excellent teamwork, efficient meetings</td>
<td></td>
<td>Build team moral, Hang out together outside of project, Address personal conflicts immediately</td>
<td>Divide up the project milestones so that team members can work separately</td>
</tr>
<tr>
<td>Basic knowledge of underlying technology</td>
<td>Better understanding of IS&amp;T's needs</td>
<td></td>
<td>All members of team spend time learning the underlying technology</td>
<td>Depend on computer science major to understand and explain technology</td>
</tr>
<tr>
<td>Access to IS&amp;T's data on current implementation and their plans for the future</td>
<td>Better recommendations for integration</td>
<td></td>
<td>Meet with IS&amp;T representatives effectively and often to learn about current infrastructure</td>
<td>Provide a higher level view of possible project implementations</td>
</tr>
</tbody>
</table>
## VI Gantt Chart

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Start</th>
<th>Finish</th>
<th>Duration</th>
<th>Resource Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meet with Champion</td>
<td>2/24/2005</td>
<td>2/24/2005</td>
<td>1d</td>
<td>All</td>
</tr>
<tr>
<td>2</td>
<td>Initial Project Plan</td>
<td>2/24/2005</td>
<td>3/3/2005</td>
<td>6d</td>
<td>All</td>
</tr>
<tr>
<td>4</td>
<td>Online Technology Research</td>
<td>3/6/2005</td>
<td>3/15/2005</td>
<td>6d</td>
<td>Harel</td>
</tr>
<tr>
<td>5</td>
<td>Collect information from IS&amp;T on current wireless implementation</td>
<td>3/6/2005</td>
<td>3/15/2005</td>
<td>6d</td>
<td>Harel</td>
</tr>
<tr>
<td>13</td>
<td>Analysis &amp; Preliminary Conclusions</td>
<td>4/5/2005</td>
<td>4/12/2005</td>
<td>6d</td>
<td>All</td>
</tr>
<tr>
<td>14</td>
<td>Status Report</td>
<td>4/12/2005</td>
<td>4/14/2005</td>
<td>3d</td>
<td>All</td>
</tr>
<tr>
<td>15</td>
<td>Preliminary Presentation to Stakeholders</td>
<td>4/1/2005</td>
<td>4/2/2005</td>
<td>8d</td>
<td>All</td>
</tr>
<tr>
<td>16</td>
<td>Revise &amp; Practice Presentation</td>
<td>4/21/2005</td>
<td>4/27/2005</td>
<td>5d</td>
<td>All</td>
</tr>
<tr>
<td>18</td>
<td>Final Presentation</td>
<td>4/28/2005</td>
<td>5/5/2005</td>
<td>6d</td>
<td>All</td>
</tr>
<tr>
<td>19</td>
<td>Final Report to IS&amp;T</td>
<td>4/5/2005</td>
<td>5/10/2005</td>
<td>26d</td>
<td>All</td>
</tr>
</tbody>
</table>
Outdoor Wireless at MIT

Project Status Report #1
3/17/2005

Team Wireless
Janice Lin, Jessica So, Ashvini Thammaiah, Harel Williams
Provide a dashboard light of the overall prospects for achieving the project as laid out in the original project plan: green, yellow, or red

Currently, the project is on schedule and has a good chance for achieving the project as we have originally planned. The project is status is green.

I. Accomplishments
The accomplishments we have experienced thus far include the approval of our project plan by our champion and professor, a basic understanding of outdoor wireless industry and technology, and the preliminary research of university usage of outdoor wireless technology.

When conducting online research on outdoor wireless device vendors, we learned that Enterasys, one of the vendors that MIT was considering since they have used Enterasys for indoor wireless, has discontinued its outdoor wireless solution. However, we have gathered information about 5 other outdoor wireless solution vendors.

In addition to research online, we have contacted five universities asking for information on their outdoor wireless. Central Washington University has called us back and is ready to answer any questions we have. Carnegie Mellon University replied via e-mail stating that they have a CD with the information we need and they will send it to one of the team members. University of South Carolina gave us a contact that can get us the information we need. The other universities have not replied yet. The prompt responses and willingness to assist us will help us move forward quickly in our research.

We have also discovered that wireless technology 802.11a/b/g is a very viable option for providing network access outdoors. Even in the presence of harsh environmental factors, such as heavy rain or snow, the signal is barely affected, and therefore does not bring down a wireless link. The only real difference between indoor and outdoor wireless access points is that the outdoor access points require a outer casing which protects the electronics from environmental factors. Additionally, you may not have to run wiring to the access points for network connectivity if you mount wireless bridges on building that already have lines installed. The wireless bridge then serves as the connection between the outdoor wireless access point and the wired connectivity on the network.

II. Issues
A foreseen risk that actually occurred is the fact that there is limited amount of information available on the vendors’ and universities’ websites. We have found in researching thus far is the lack of specific information on outdoor wireless technology in universities. On university websites, we couldn’t find information regarding solutions to implementation problems, criteria for selecting vendors, and processes for implementing the infrastructure. This doesn’t affect the uncertainties or risks portion of our plan too much because we plan on interviewing key people to get the facts we need. Another foreseen risk is that since we are not experts on wireless technology, sometimes it is difficult for us to make accurate comparisons across vendors in terms of their strengths and weaknesses.
It has also proven difficult to meet in person with the contact person for the technical side of the wireless technology. It is important that any outdoor implementation of wireless technology must integrate with the current remote management system that IS&T has implemented for their existing wireless access points. However, a meeting is tentatively scheduled with the appropriate persons immediately after spring break.

III. Actions to be taken
We think that we are on track with the project plan and there haven’t been any new issues that require any revisions to our original schedule. However, we will continue to conduct extensive research in order to find relevant information for our report.

As stated in our project plan, the next step after online research is to conduct field research by actually interviewing different vendors. This stage will be accomplished by April 5. The following vendors will be researched in further depth through phone interviews: 1) Avaya, 2) SmartBridges, 3) D-Link, 4) InPath Devices, 5) National Datacomm Corporation.

We will be calling the universities to interview them regarding implementation problems, criteria for selecting vendors, processes for implementing the infrastructure, and any suggestions they may have for MIT. We need to call the universities as soon as possible so that we show our appreciation for their interest in helping us.

IV. Reflections and Learning
This project fits in very well with our current module of Implementation and Change. Implementing outdoor wireless access for the entire MIT campus will be a very drastic change and the implementation of it is no simple task. Through speaking with our project champion, Ms. Regan, it is interesting to see how large organizations, such as MIT’s IS&T, plan for large-scale future changes. The amount of uncertainty is overwhelming, and it’s part of our role, as a research team, to help clear up some of those uncertainties.

Our team is definitely learning a lot, both internally and externally. Internally, we are learning how to communicate more effectively with each other, and how to help keep each other on track. Externally, we are learning how to digest the vague information we collect online and try to make sense out of it together. In addition, as soon as we get to interview the schools, we will probably learn the different way universities approached the implementation, the problems that arose during implementation, and the corresponding solutions universities derived to resolve the issues. It was interesting to see that universities were so willing to help that they replied back the next day with how we could find the information we needed. We will also be able to use our knowledge from class to suggest ways for MIT to avoid the problems that are commonly seen in managing IT projects.
Outdoor Wireless at MIT

Status Report 2
3/31/2005

Team Wireless
Janice Lin, Jessica So, Ashvini Thammaiah, Harel Williams
Our project is still on schedule despite some roadblocks (mainly because we planned for them). Project status is still Green.

I. Accomplishments

The accomplishments we have experienced thus far include compiling a full list of universities we would like to contact. On this list we have also included key contact information and have space for other data we will collect. This list will be essential to ensure that both team members working on this portion will be asking for consistent information and will know exactly who the other person has already interviewed. We are in the process of scheduling interviews at universities that have responded to our initial contact. In addition we are compiling a consistent list of questions to ask the universities.

The following is a list of universities we contacted and the number of outdoor locations (moderately sized) for which they currently provide wireless.

<table>
<thead>
<tr>
<th>University</th>
<th># of Outdoor Wireless Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie Mellon University (CMU)</td>
<td>Few</td>
</tr>
<tr>
<td>Central Washington University (CWU)</td>
<td>2</td>
</tr>
<tr>
<td>Bowling Green State University (BGSU)</td>
<td>3</td>
</tr>
<tr>
<td>University of South Carolina (USC)</td>
<td>Few</td>
</tr>
<tr>
<td>Columbia University</td>
<td>Few</td>
</tr>
<tr>
<td>University of Pennsylvania</td>
<td>1</td>
</tr>
<tr>
<td>University of Virginia</td>
<td>2</td>
</tr>
</tbody>
</table>

We have contacted 5 vendors to conduct phone interviews, some of which were moderately successful. The vendors are:

- Avaya
- SmartBridges
- D-Link
- InPath Devices
- National Datacomm Corporation

After some research into how IS&T manages their wireless access points, we are fairly confident that the hardware provided by the vendors above would integrate with the current remote management system in place on campus. This is preliminary, however, and we hope to guarantee this by next week.

We have also identified a number of wireless ISPs to contact concerning their implementation of wireless over extensive outdoor areas:

- Speednet Services, Inc.
- CommSpeed
- Prairie Inet
- AMA TechTel Communications
- Mesa Networks

All these ISPs have over 3,000 subscribers each. However, similarly to the vendors, it has proven difficult to talk to anyone beyond sales representatives, but we are waiting on a number of returned phone calls and emails.
Like all teams, we presented the status of our project to the class and received much helpful feedback.

II. Issues

In one conversation we had with a representative from a university, she warned that our questions may not be answered by the right people. She said we had a “50/50” chance of getting the information we wanted. We had anticipated this kind of risk (refer to exhibit IV of our project plan) and we intend to question even more schools or refer to our champion for some IS&T personal contacts at other universities.

On a similar note, when trying to reach people who can answer our questions concerning technical and implementation issues at the vendors, we were unable to speak to those individuals who could rightfully answer our questions; they were usually “out of the office” or “unavailable.”

It has also become clear that we need to clarify a number of points about the scope of our project in the context of IS&T with our champion, Ms. Regan.

III. Actions to be taken

Currently, we are on track according to our timeline and there haven’t been any new issues that require any revisions to our original schedule. We will continue to contact universities and obtain as much information as possible regarding outdoor wireless at other campuses.

As far as vendor and wireless ISP contact is concerned, we will try to identify additional vendors and ISPs beyond the ones we currently have, and follow up with the current list to communicate with those individuals who can rightfully answer our questions.

It is also very important that we clarify the scope of our project with Ms. Regan as soon as possible. A meeting will be scheduled for the coming week.

IV. Reflections and Learning

As our project progresses, we are learning a number of lessons about practical project management. We are actually starting to encounter many issues that we have seen in past case studies. For example, uncertainties such as being unable to obtain all information as originally planned, has been a slight barrier. Also, we also learned that streamlining communication is extremely important as we see this show up in our communication with our project champion.

The project review session on March 29 was extremely useful. Through feedback from the class, we learned of many additional areas on which we should spend more time planning and considering. For example, a classmate pointed out that it seemed like our project was carrying out two parallel processes instead of ending up with one main recommendation. This was an interesting point because we were asked to carry out the two separate research paths, but perhaps we can speak with our champion to see if there is anyway for us to consolidate what we are looking for and be able to make one single strong recommendation at the end.
Outdoor Wireless at MIT

Status Report 3
4/14/2005

Team Wireless
Janice Lin, Jessica So, Ashvini Thammaiah, Harel Williams
Our project is still on schedule despite some roadblocks (mainly because we planned for them). Project status is Yellow.

I. Accomplishments

We have succeeded in contacting 6 universities and have received detailed information from 3 universities. Columbia University, UVA, and Carnegie Mellon have all implemented outdoor wireless on their campuses. We extracted the following information via email communication:
- vendors used
- criteria used to evaluate vendors
- outdoor wireless infrastructure
- implementation length (time)
- securities issues
- implementation problems

Of the 5 vendors we tried to contact (Avaya, SmartBridges, D-Link, InPath Devices, and National Datacomm Corporation), 2 of them (D-Link and InPath Devices) responded with extremely helpful information. In particular, they were able to answer the following questions:
- What solutions do they use? What kinds of access points are offered?
- How easily can their system be integrated with our existing networks?
- What are some qualities that make them a strong candidate for MIT to consider?
- Do they have experience with implementing outdoor wireless internet at college campuses?
- What is their pricing scheme?
- What is their outlook on the future of outdoor wireless technology?

A Vendor Comparison Chart is being filled as information is collected.

We are currently in the process of contacting the following wireless ISPs:
- Speednet Services, Inc.
- CommSpeed
- Prairie Inet

We have received generic information from them but we are still waiting for them to respond to more specific questions.

II. Issues

We have been hoping to meet with our Project Champion to discuss the exact scope of our project. Unfortunately, we have been unsuccessful in getting in contact with her, but we will continue our efforts in doing so. We plan on sending her this project status report which hopefully will foster discussion regarding our current progress and direction.

For contacting vendors, though we are more successful recently, many vendors are still unresponsive. This is a foreseen uncertainty and we will continue our efforts to contact vendors as we planned.

III. Actions to be taken

Our status is yellow mainly because we have not been able to update our Project Champion on our progress and figure out our exact goal and direction. We will try to firmly establish the scope and expected final deliverables and work backwards from there. We will arrange a meeting with
our Project Champion within this next week to ensure that our current efforts are in line with her goals.

We will also continue to contact the remaining universities for their information and compile the data as we collect it. After seeing which vendors they considered when implementing outdoor wireless, we will research those vendors. Though obtaining responses from vendors has been difficult, we will continue to pursue interviews and try asking IS&T for personal contact information.

IV. Reflections and Learning

As the semester progresses and work is building up in our classes, we realized that we need to make a much harder effort to gather the group. At the same time, however, our team synergy is working very well and meetings are running extremely effective.

We see that our project reflects many aspects of IT Management discussed in recent classes. For example, with this outdoor wireless project, MIT seems to be investing IT budget into the Infrastructure aspect of the IT Pyramid with Infrastructure, Transactional, Information, and Strategy. At the same time, by making MIT a more technologically advanced university, this could also play into the Strategy part of the IT Pyramid. Also, we thought the idea of a comprehensive MIT Process Handbook would be extremely helpful to our project. We would be able to look up universities who have implemented outdoor wireless in the past, have an immediate list of contact information, and have access to case studies and best practices that might give insight to implementation issues and solutions.
Preparing for Case Discussion

In preparing for class, we recommend that you read the case three times. The first reading should be a quick run-through of the text in the case. It should give you a feeling for what the case is about and the types of data it contains. Your second reading should be in more depth. Many people like to underline or mark up their cases to pick out important points they know will be needed later. Your major effort on a second reading should be to understand the decision problem and context. For example, analyze the case with respect to customer behavior and trends, competitor’s behavior and trends, and the firm’s strengths and weaknesses.

On your second reading, carefully examine the exhibits in the case. Usually the case writer has put the exhibits there for a purpose, although some exhibits will be superfluous and some may even be inconsistent -- just as real data are. But mostly, the exhibits contain information that will be useful in analyzing the situation. You will often find that you will need to apply an analytical technique to an exhibit in order to benefit from the information in the raw data. Averages, ratios, break-even analyses, and comparisons with other exhibits are often helpful.

On the third reading you should have a good idea of the fundamentals of the case. Now you will be searching to understand the specific decision problem. Part of the case analysis process, as in real life, is identifying the real decision problem amidst lots of data and information. It is your task to figure out what decision(s) must be made (if a decision needs to be made at all), make action recommendations, and consider how you would specifically implement your recommendation.

Sometimes you will get thinking questions about the cases (posted on the class web-site). Before the third reading you may want to review these questions to stimulate your thinking and highlight issues that you should have a working knowledge of before the class discussion. These questions are not necessarily “tips for a successful case solution,” but rather are meant to insure that everyone understands the basics of the case and the discussion can begin “on the same page.”

During the class discussion, you should be prepared to share your thoughts on the real problems and issues of the case and present a persuasive summary of your recommendations. Be prepared to explain why you rejected any obvious alternative courses of action and provide vital facts supporting acceptance of your recommendation. Your goal is to convince the class that your recommendation is the best. However, a rigorous approach will consider both sides to every recommendation. You should be up-front about potential problems you might expect in implementing your recommendation.

Finally, an important concern in any discipline is the ethics of its practitioners. This is certainly true in marketing and advertising. Ethical issues will arise in the case discussions and lecture discussions. Indeed, some managers in the cases act in ways you might not consider ethical (and in some situations these actions are mentioned in the case specifically to raise ethical issues). We encourage you to address these issues in class discussion.

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