
Middleware Business Case

The Writer's Guide

A writer's guide to accompany the sample Middleware Business Case developed by the Internet2 Middleware Early Adopters Team

Discussion DRAFT

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24 October 2001

Writer's Guide for Creating a Middleware Business Case

Both The Writer's Guide for creating a Middleware Business Case and the sample Middleware Business Case are documents produced as part of the Internet2¹ Middleware Early Adopters program². Early Adopters is a group of eleven institutions of higher education working to provide a testbed for the deployment of middleware technologies.

Middleware, sometimes referred to as "software glue", is a layer of software services between an institution's network and its applications. In today's Internet, applications usually have to provide these services themselves, which leads to competing and incompatible standards. Middleware utilizes directory software to provide services such as user identification, authentication, and authorization. By promoting standardization and interoperability, middleware will make advanced network applications much easier to use and facilitate inter-institutional access. Directory services are at the core of middleware services. The directory identifies people affiliated with the institution and the roles they play within the institution (student, faculty, staff, guests, alumni, parents, etc.). The directory often serves as an authentication service or supports other authentication services. The basic concept of middleware – providing identification, authentication, and authorization services - is at the heart of all services we now deploy.

Purpose of the Writer's Guide and the Sample Middleware Business Case

The sample Middleware Business Case has been put together to help higher ed institutions create a compelling argument for an institutional investment in middleware. The document starts with a broad conceptual framework for middleware – what it is and what it enables. It includes sections that comprise a business case for such an investment, the specific uses of middleware and the applications it enhances and enables, and the impact such an endeavor is likely to have on an enterprise.

The assumption underlying the sample Middleware Business Case is that a reader will use it virtually as is, or as the basis for writing his or her own case, adjusting it to reflect the unique needs and realities of his or her institution.

The Writer's Guide is a "helper" document that provides additional guidance to those wishing to use the sample Case for their own middleware justification. The format of the Writer's Guide follows the format of the sample Middleware Business Case. Each section is explained; at times there are examples provided that further illustrate a point in the case document. Occasionally, instructions are provided on how to best use the sample Middleware Business Case to create your own.

In addition to this Writers Guide, there is another supporting document for project planning.

Audience for the Business Case

Who is your audience? The sample Middleware Business Case assumes you are writing primarily for people who are responsible for the making of strategic IT and funding decisions, such as CIOs, IT Architects, and IT Directors, CFOs and other fiscal officers. The document is directed toward institutions that are thinking about, or just beginning to implement middleware strategies.

With proper modification however, it can be used to target technical staff residing deeper in the organization. How much you accent the non-technical and the technical will depend on who you want to convince or influence with the case. A glossary has been included in both the sample

¹ Internet2 organization, <http://www.internet2.edu/>

² Internet2 Middleware Initiative, <http://www.internet2.edu/middleware>

case and this Writer's Guide to help with the technical jargon that is used. Be sure to add any additional terminology you may include on your own.

References

There are a number of resources available addressing middleware in general, and directories in particular. Some good starting points include:

The Burton Group, Network Strategy Service (www.tbg.com)

www.tbg.com

"The Enterprise Directory Value Proposition" v1, 23 Feb 1999, Jamie Lewis, Dan Blum

The Burton Group's Research & Advisory Services, which include the Network Strategy Service and Networks & Telecom Strategy Service, are a premiere source of technology analysis for network planners. This site offers a number of white papers and other information specific to directories and directory-enabled IT infrastructures.

The Gartner Group (www.gartner.com)

The Gartner Group provides strategic consulting services to more than 10,000 organizations worldwide. This site is an excellent general reference for a host of middleware topics.

Internet2 Middleware Website (www.internet2.edu/)

At this site you will find middleware tutorials, information about a wide range of middleware-based initiatives happening at national and regional levels in higher ed, as well as a library of applicable documents and papers.

The Sample Middleware Business Case, section by section

Executive Summary

An Executive Summary is recommended. A commitment to designing an infrastructure that uses middleware is significant. The issues of data and resource management are sweeping – the audience for the business case is broad (across), high (up the hierarchy), and diverse (technical groups and business groups). You will want buy-in from many corners of the institution. You'll reach more people if you provide a concise and convincing executive summary in addition to a fully realized case study.

I. Introduction

You will likely want to supplement the verbiage in the sample case with institution-specific examples of problems that can be solved by middleware, and how. Succinctly describe the state of affairs at your institution, express the potential of a middleware investment and the changes it can make. Reference the changes that must happen to fully realize middleware's potential (centralization, levels of data management and administration that may not currently exist, e.g.) The focus of the Introduction is more inward than outward (compared to a Statement of the Opportunity, see below).

II. Statement of the Opportunity

This section is intended to help the reader relate middleware services to wider institutional interests by identifying a number of fundamental issues affecting all of higher education, and briefly discussing how middleware can support efforts that address these issues. The Statement of the Opportunity is more outwardly focused (versus the Introduction), providing a broader context in which one can see the strategic value of middleware, made clear in the final three paragraphs of the section. A commitment to middleware should not be undertaken lightly. A strong statement of opportunity declares the potential benefits early on, engaging decision makers in a positive way.

III. Business Case for Middleware

Section III is intended for IT leaders, identifying in detail the benefits and the costs of committing to a middleware strategy. This section is the heart of the case, identifying at greater levels of detail the objectives, benefits, specific uses and applications, and once committed to, the impacts that using middleware has on an institution. You may choose to use only a few of these examples to tie a middleware deployment to specific needs on your campus (such as single sign-on), or list them all to show the full potential a middleware services deployment can offer.

Seven Positive Effects

This section provides a summary statement of the value of middleware technologies – IT services provided more securely and more cost effectively.

Benefits

This section follows on the previous by going into greater depth on specific enhancements to common services made possible by middleware.

Specific Uses/Applications

This section goes into even greater detail, itemizing 24 applications made better or more manageable by middleware, grouped by service.

Impacts

This last section describes six key areas of impact for those institutions prepared to make a commitment to a middleware strategy.

IV. Project and Financial Overview

It is important to consider the capital and operational costs to fully understand the impact this type of project can have as a foundation component within an enterprise.

The methods of securing funds for this project can vary from campus to campus and will depend largely on the existing staff, their expertise and level of commitment to other production systems. It is possible to absorb the cost of this project into existing initiatives that are underway, or within ongoing operational budgets. It can be submitted to management for funding as a standalone project as well. This is a case-by-case decision and will depend largely on local considerations such as funding availability and willingness to take on new initiatives.

The case provides details for both scenarios: seeking funding as a standalone project, or for a project using existing resources.

The sample case includes a budget for a “new initiative”, standalone project. A full-fledged return on investment model has been included in this Writer’s Guide to assist the reader with estimating an institutional ROI for his or her own needs (see Appendix F).

V. Recommendation

The language of this section of the Generic Middleware Business Case allows recapitulation of the key points of your case, with direct transition to a recommendation of action, funding level, and start time.

Appendices

Following is a range of appendices. They are a mix of things that you may find useful when constructing your case: how middleware is being used at other schools, important, specific information about the different types of directories, why directories are so important to middleware and how to make a strong one, a section on risks and contingency plans, and a glossary. Last is Appendix G, which is a sample ROI for the fictitious Alpha University, using Business Layers’ ROI Calculator. All of these can be used as is, or can be altered to accommodate changes you make to your case.

Appendix A: Institutional Examples

I. Business drivers

Johns Hopkins University

This directory will not only offer an electronic version of our institutional phone book, but will also provide a centralized method for application providers to authenticate and credential a user upon login, saving a duplication of account management efforts across the organization. With the increasing need to secure our transactions using digital signatures and data encryption, a central repository of user identity information becomes critical. Finally, the need to start-up and shutdown user accounts as people move in, around and out of the institutions is being driven by an increasing need to more effectively manage our resources and maintain a secure computing environment.

University of Memphis

The University of Memphis is the lead institution in the Tennessee Board of Regents system of higher education, which has for many years been one of the poorest funded state systems in the nation. Although few institutions do not perceive funding to be a leading issue, the U of M has chronically faced comparatively severe and firm resource barriers. Investing some of U of M’s

limited resources in middleware has proven to be very enabling and the technologies themselves fairly inexpensive to operate. U of M's total IT infrastructure requires a smaller skill set to operate than it would without heavy reliance on middleware, and therefore its operation can be undertaken by a smaller staff. The twin virtues of efficiency and enablement are both the justification and the consequence of this approach.

University of Maryland, Baltimore County

The University of Maryland Baltimore County (UMBC) began its first online program in 1998. Once we start dealing with students located in nationally and internationally, which never set foot on our campus, we realized the necessity of making campus services self-service through the web. In the spring of 1999, as part of our IT planning work, we met with faculty on this online program and with others using technology enhanced learning tools, to identify their needs. This resulted in three priorities:

- Revamp our existing web-based administrative services and create a web portal that would provide all services in one place for students.
- Revamp our account generation process, which was online but required students to show IDs when they picked up their accounts, to allow students to create their account over the web and never have to set foot on campus.
- Better integrate our course management tools with our institutional systems to eliminate the work of creating and distributing accounts to students and enrolling students into their appropriate courses. Creation and distribution of accounts was identified as the major impediment by faculty using these course tools in large sections.

Associated with this planning activity was a review of our administrative business systems. Our SIS and HR systems were developed on campus under a HP 3000 environment and were showing their age. While we had good transaction capabilities, we had limited tools for reporting and the systems were not integrated well in terms of data definitions. As such, it was felt that UMBC should begin investigating other options such as SCT, Oracle, and Peoplesoft for replacing these systems, now that we were ready for Y2K. We anticipated bringing up a new HR system in 2002 and a new SIS a year later.

In fall 1999, we launched our web porta, myUMBC. This was extremely successful and we began to get inquiries for providing access to myUMBC for alumni, prospective students, and parents. We knew this would create a challenge to us to revamp our authentication and authorization services. We rely heavily on a Kerberos infrastructure for authentication to campus services. This system supplied authentication services for computer lab workstations, modems, portal, email, shell access, and a number of other services on campus. The issue for us was that many services we provide were automatically granted once you had a Kerberos entry and we knew that we didn't want alumni dialing into our modems if they were given access to myUMBC. As a result, we had to develop a finer level of control for accounts and develop a set of global attributes that could be queried by any application service to determine whether to allow that person access.

Directory services and middleware have been fundamental to meeting our campus IT goals.

Tufts University

As part of its middleware strategy, Tufts is in the middle of a “Next Generation Directory” initiative. This new directory is driven by a set of policies and procedures used to build a database of people associated with the University, providing the ability to effectively and securely authenticate and authorize users in a digital world. This ability will be an absolute necessity if the University is to provide evolving network-based IT services successfully.

The Next Generation Directory is seen not just a replacement of the current “white pages” directory. It is a reinvention of the processes that Tufts uses to capture and disseminate information about people. The power of this new directory lies not only in the directory itself, but in the directory-enabled applications it facilitates. A properly designed directory will permit any application - whether deployed by the central IT organization, individual School or Division - to have controlled, secure, and reliable access to data about people at Tufts University.

Developing the Next Generation Directory will require the active cooperation of data and process owners across the University. One of the committees formed to address institutional data management issues is The Next Generation Steering Committee. It consists of key data owners and consumers and will provide ongoing oversight to this initiative. As the project evolves, Tufts believes that this group will be critical to our mutual understanding of the “data lifecycle”, as a person applies to Tufts, matriculates, graduates, and perhaps becomes employed by the University. Participation from all parts of the University is vital to a comprehensive understanding of the issues, and for developing the broad plans necessary to meet these challenges.

Dartmouth College

The deployment of middleware supports an institutional business plan at Dartmouth College to increase the number of business transactions conducted in a secure manner, on both the Internet and internal institutional networks. The objectives are to improve service by reducing the time for action completion and reduce costs by reducing the need for additional administrative personnel. A shared campus-wide middleware infrastructure will simplify application development and avoid duplicating the costs of authentication and authorization services.

Improved network based administrative services meet expectations in the College community for the availability of self-service applications. Network based services allow time and especially location independence as faculty and students are frequently off campus. Secondly, middleware should reduce the “time to market” for new purchases and deployments of network applications by providing standard compatible interfaces to authentication, authorization, accounting and auditing services.

In many ways, these types of services are competitive advantages for attracting faculty, staff and students. They may also be necessary to work with systems envisioned by the Federal Government for Student Loans and Grants and Contracts applications and processing.

Appendix B: Directories Defined

It is important to understand there are differences in directories. These differences are categorized as:

- **Application-specific directories:** These directories come bundled with, or embedded into, an application. Examples are Lotus Notes name and address book, the Microsoft Exchange directory, and Novell's GroupWise.
- **Purpose-specific directories:** The directories are not tied to an application, but are designed for a narrowly defined purpose and are not extensible. An example is the Internet's Domain Name System (DNS).
- **General purpose, standards based directories:** The directories are developed to serve the needs of a wide variety of applications. Examples include LDAP directories and X.500 based directories.

Appendix C: Requirements for a General Purpose Directory

- **Scalability** – the enterprise directory service must be able to scale well as usage increases, and as transparently as possible to the user community.
- **Performance** – the system must perform extremely well in an environment where users are spread out geographically and the majority of the transactions are read-only.
- **Management and monitoring tools** – the system must possess a strong set of administration tools, since the data will live in a distributed system of servers. Maintaining the health of the system will be critical to its success and tools to do this remotely are important.
- **Messaging system interoperability** – the directory may perform the e-mail alias to hostname resolution to facilitate mail relaying and delivery, as well as provide for single sign-on for messaging applications.
- **Server Platform** – to achieve maximum performance at the enterprise level, mid-range Unix based systems are highly recommended.
- **Bulk loading of the data** - Since much of the directory information is maintained in legacy systems such as Payroll and the student registration system, it will be important to be able to receive updates to the directory very frequently from these systems. The ability to receive and process bulk-loaded information securely and quickly is very important in order to maintain data synchronization between the directory and the various systems of record.
- **API (application programming interface) and SDK (software development kit) availability** – The system must be accessible using development tools that exist within the mainstream toolkits of programmers today such as Perl, XML and comparable products.
- **Extensibility** – the directory schema will need to be extended to accommodate the “EDU person” as defined by the MACE Project (<http://www.internet2.edu/middleware/MACE>) working within the Internet2 Middleware Initiative (<http://www.internet2.edu/middleware>).

- **Directory Schema** – Industry accepted object classes such as Person and inetorgPerson should be utilized as much as possible. At no time should an industry prescribed attribute should be repurposed for organizational use, rather an additional attribute added to the organization's object class to handle the data requirement.
- **Adherence to industry standards** – The system must utilize recognized standards that have been developed or are developing, such as LDAPv3 (lightweight directory application protocol), DSML (directory service markup language), CIM (common information model), DEN (directory enabled networking), DHCP (dynamic host configuration protocol), DNS (domain name service), RSVP (admission policy) and DiffServ (differentiated services for bandwidth allocation).
- **Auditing tools** – The system must include robust, configurable auditing tools so that performance information, usage monitoring and forensics can provide invaluable information about the operation of the directory service.
- **Protection from DOS attacks (and others)** – The directory servers should be isolated as much as possible on the network and live behind firewalls. IDS should be running on each directory server to detect intrusions, with pager alerts sent to the support engineer(s).
- **Read vs. Write operations** – write operations to the directory must require a higher level of authentication than read operations. For example, a user must use a public key certificate over a protected SSL connection in order to write data to the directory.
- **Replication** – Directory replication links that are accessible to users are vulnerable to eavesdropping and tampering and therefore should be sent over secure connections. SSL or a comparable method should be used for the replication traffic. At no time should replication traffic travel in the clear on a network segment accessed by users. Additionally, physical security to the directory servers should be restricted to only authorized personnel by a card key or biometric system.

Appendix D: Risks and Contingency Plans

A strong middleware project plan will include a discussion of major risks in the project and possible solutions to address those problems if they should arise. Here are some of the risks and contingency plans already identified by previous Middleware projects.

Incompatible application demands on LDAP schema

Risk: The complexities of the LDAP schema are substantial. It is desirable to use common definitions to support interoperation. Individual applications (which may be added later) may have conflicting requirements.

Contingency Plan: This problem is the focus of a number of research and standardization efforts. Hopefully this will be less of a problem as more systems are deployed and experience is gained. Total integration of directory systems may not be practical.

LDAP maintenance feeds

Risks: Feeds of data elements from multiple “systems of record” need to be merged into the LDAP directory. These can be complicated to synchronize and have many operational considerations.

Contingency Plan: Tradeoffs may need to be made possibly sacrificing the frequency of maintenance or requiring the development of interchange tools. The security of LDAP maintenance is a recognized concern, which must be addressed.

Development of Policy

Risks: There are a number of substantial policy issues to address and these take time to resolve with the various stakeholders in an academic institution.

Contingency Plan: Significant efforts will be needed to involve and inform the various stakeholders. Resolution of the issues may delay or limit the universal availability of some services.

Support from the institutional data custodians needed

Risk: If the data custodians are not involved in the planning, the trust of the entire middleware deployment could be compromised. In addition, if the Institution unknowingly shares personal data that is protected by FERPA, it could be named in a lawsuit.

Contingency Plan: Data custodians, if not involved as key project team members, must be kept informed of project plans and proceedings.

Availability of Applications

Risk: Client applications interfacing to essential network systems and servers need to incorporate LDAP and PKI features. These may not be readily available or provide needed cross platform support.

Contingency Plan: The usual risks with vendors and product development may delay or limit the universal availability of some services. Open source solutions may be an option to limit the need for institutional software development.

Appendix E: Glossary

Authentication - the process of establishing whether or not a real-world subject is who or what its identifier says it is. Identity can be proven by:

- Something you know, like a password
- Something you have, as with smart cards, challenge-response mechanisms, or public-key certificates
- Something you are, as with positive photo identification, fingerprints, and biometrics

Authorization - the act of determining if a particular right, such as access to some resource, can be granted to the presenter of a particular credential

Directories - the operational linchpin of almost all middleware services. They can contain critical customization information for people, processes, resources and groups. By placing such information in a common storage area, diverse applications from diverse locations can access a consistent and comprehensive source for current values of key data. In future information technology environments, directories will be among the most critical services offered.

Identifiers - an identifier is a function that maps real-world subjects into name or character strings, so that distinct subjects have distinct strings. A real-world subject may be a person, an object (i.e.: a printer or a file), a group, or a department. A real-world subject can have multiple identifiers. When campuses seek to interoperate, issues will arise on the type of identifier that needs to be exchanged, and the forms and policies for that identifier. Moreover, to the degree that identifiers enable users to access other forms of electronic credentials, there may need to be agreements and consistency between campuses about the policies associated with classes of identifiers.

Early Adopters - the campus test bed phase of Early Harvest, pushing forward the deployment of core middleware at thirteen US campuses. Based on this experience, Early Adopters will develop roadmaps for other campuses to follow in their own deployments. Both Early Harvest and Early Adopters are sponsored by Internet2 and received some funding from the NSF.

IMAP – Internet Message Access Protocol, a method used by many email client programs to interact with a mail server to enable users to send and receive messages and manage their email folders. IMAP's chief distinction is that users may keep all of their mail folders on a central server and so have location independent access to their email.

Internet2 - the research and development of advanced Internet technology and applications vital to the research and education missions of higher education. Over 170 U.S. universities, working together with partners in industry and government, are leading the Internet2 project. Internet2 is working to enable applications, such as telemedicine, digital libraries and virtual laboratories, that are not possible with the technology underlying today's Internet. As a project of the University Corporation for Advanced Internet Development (UCAID), the Internet2 project is not a single separate network, but rather joins member network application and engineering development efforts together with many advanced campus, regional, and national networks. <http://www.internet2.edu>

ISO – Integrated Sign On. Usually used in reference to the web (a web ISO), this is a type of credential forwarding mechanism that can be used to forward authentication credentials to participating servers. Generally, upon first encountering a server participating in a web ISO system, a user's browser is redirected to an ISO server to authenticate. A special cookie containing a resultant credential is cached for a limited time in the user's browser, which is then redirected back to the original server. Participating servers are configured to first check for this cookie to obtain the user's credentials, effecting a single sign-on system.

LDAP - Lightweight Directory Access Protocol. A protocol that provides access for management and browser applications that provide read/write interactive access to the X.500 compatible directories.

Middleware - or "glue", is a layer of software between the network and applications. This software provides services such as identification, authentication, authorization, directories, and security. In today's Internet, applications usually have to provide these services themselves, which leads to competing and incompatible standards. By promoting standardization and interoperability, middleware will make advanced network applications much easier to use.

PKI - Public Key Infrastructure. The software, protocols and legal agreements that are necessary to effectively use digital certificates combine to form a Public Key Infrastructure (PKI). A PKI has several components.

- A Certificate Authority (CA), that manages and signs digital certificates for an institution
- Registration Authorities, operating under the auspices of the CA, that validate users as having been issued certificates
- PKI management tools, including software to manage revocations, validations and renewals
- Directories to store certificates, public keys, and certificate management information
- Databases and key-management software to store escrowed and archived keys
- Applications that can make use of certificates and can seek validation of others' certificates
- Trust models that extend the realm of secure communications beyond the original CA
- Policies that identify how an institution manages certificates, including legal liabilities and limitations, standards on contents of certificates, and actual campus practices

POP – Post Office Protocol. An old and simple method used by many email client programs to enable new mail to be retrieved from a central mail server and stored on the user's computer.

QoS - quality of service. Measure of performance for a transmission system that reflects its transmission quality and service availability.

RADIUS - Remote Authentication Dial In User Service. A protocol for carrying authentication, authorization, and configuration information between a Network Access Server (e.g., dialup server or wireless access point) which desires to authenticate its links, and a shared Authentication Server.

SMTP – Simple Mail Transfer Protocol. The Internet standard means of transporting email from sender to recipient.

SMTP AUTH – a means of authenticating the originator (a user as they initially send an email) or relay (an email transport system along the route to the recipient) of an email message so that the sender of the email can be ascertained. Some email client programs will automatically and silently supply authentication credentials to an SMTP AUTH configured outgoing mail relay, easing the deployment of applications requiring authenticated email.

VLAN - virtual LAN. Group of devices on one or more LANs that are configured (using management software) so that they can communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments. Because VLANs are based on logical instead of physical connections, they are extremely flexible.

VPN - Virtual Private Network, which Enables IP traffic to travel securely over a public TCP/IP network by encrypting all traffic from one network to another. A VPN uses "tunneling" to encrypt all information at the IP level.

X.509 - This specification profiles the format and semantics of certificates and certificate revocation lists for the Internet PKI.

Appendix F: Sample ROI using the Business Layers ROI Calculator³ for Alpha University

Step 1 – Define your organization

For the purpose of this document, we chose a mid-sized university, with a combined mix of faculty, students and staff totaling 10,000 users of networked resources. We used turnover rates somewhat higher than industry findings in the corporate sector, since we have students and faculty which change annually as a matter of doing business.

Field	Value
Number of employees in your company:	10,000
Rate of growth per year (% of employees):	10 %
Turnover rate per year (% of employees):	20 %
Rate of moves, adds, and changes (MACs):	15 %
Number of new employees per year:	1,000
Number of replacements per year:	2,000
Number of MACs per year:	1,500
Total employee changes per year:	4,500

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³ Found at <http://www.businesslayers.com>

Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 2 – Define the IT Costs

To define the cost of IT labor, we chose a conservative rate, which includes salary and benefits combined. And, since many schools have a very thin IT support staff, we chose a low number of staff members to handle the account management tasks.

Business Layers™ Making People Productive from Day One™
Return on Investment Calculator

Direct IT Provisioning Costs

Direct IT provisioning costs are expenditures associated with getting employees up and running when they join the company, and out of the system when they leave the company.

Cost of IT labor How much do your IT people earn (per hour)?:	\$	<input type="text" value="45.00"/>	
Number of work hours / year:		<input type="text" value="1,920"/>	i
Percentage of work time that an IT staff member spends handling setups:		<input type="text" value="15"/>	i
Percentage of work time that an IT staff member spends handling moves / adds / changes (MACs) and teardowns:		<input type="text" value="20"/>	i
How many IT staff members (or contractors) are dedicated to employee setups, teardowns, and macs?:		<input type="text" value="25"/>	i
Total direct IT costs:		\$ 756,000.00	

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Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 3 – Define the Cost of Lost Productivity

Again, these numbers will vary from campus to campus, but for the purpose of this model, we estimated conservatively, to keep it as realistic as possible. Most schools do not even consider the cost of lost employee productivity since there is no driving bottom line that needs to be managed. However, lost productivity should be considered and measured if a school wants to compete with for-profit organizations that are now in the higher education marketplace.

Business Layers™ Making People Productive from Day One™
Return on Investment Calculator

Lost Productivity Costs

These costs are associated with the loss of an employee's productivity when they don't have the IT resources and services necessary to do their jobs.

Average yearly salary of typical employee:	\$	<input type="text" value="55,000.00"/>	i
Amount of time an employee is unable to work when they are hired, due to missing IT resources (in hours):		<input type="text" value="16"/>	i
Amount of time an employee is unable to work when they undergo a business change, due to missing IT resources (in hours):		<input type="text" value="16"/>	i
Hourly cost of a typical employee:	\$	29	i
Cost of lost productivity for new employees:	\$	1,375,000.00	i
Cost of lost productivity for existing employees:	\$	687,500.00	i
Total lost productivity costs:	\$	2,062,500.00	

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Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 4 – Define the Cost of Faculty/Student/Staff Inactivity

The screenshot shows a web browser window titled "Flash" with a menu bar (File, View, Control, Help). The main content area is titled "Business Layers™ Making People Productive from Day One™ Return on Investment Calculator". The current section is "Opportunity Costs", which includes a definition: "Opportunity costs are associated with what else could have been done if an employee was provisioned faster and more accurately." A sidebar on the left lists steps 1 through 9, with "4. Opportunity Costs" highlighted. The main area contains a table of input values and their calculated impact on total opportunity costs.

Question	Value	Info Icon
How much money is missing from the company's bottom line due to one employee's inactivity for one hour?	\$ 100.00	i
Amount of time an employee is unable to work due to inactivity when hired?	16	i
Total number of new employees per year:	3,000	i
Amount of time an employee is unable to work due to inactivity when undergoing a business change:	16	i
Total number of changes for existing employees per year:	1,500	i
Total opportunity costs:	\$ 7,200,000.00	i

At the bottom of the interface, there are navigation buttons: "Back", "Next", "Print Report", "Compare!", "Reset all sample values", and "Reset this page". A copyright notice at the very bottom reads: "Copyright 2001, Business Layers, Inc. The user agrees not to re-distribute any components, source code, or any other downloaded content without the expressed written consent of Business Layers."

Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 5 – Define the Indirect Costs

When trying to quantify the cost of security breaches, fraud and network sabotage, we used a totally fictitious number, but stuck with the industry findings for amount of IT staff time spent troubleshooting and providing user support to incorrectly configured services.

The screenshot shows the 'Business Layers ROI Calculator' interface. The title bar reads 'Flash' and the menu bar includes 'File', 'View', 'Control', and 'Help'. The main header says 'Business Layers™ Making People Productive from Day One™ Return on Investment Calculator'. A sidebar on the left lists navigation options: 1. Company Information, 2. Direct IT Provisions Costs, 3. Lost Productivity Costs, 4. Opportunity Costs, 5. Indirect Costs (highlighted), 6. Summary, 7. eProvisioning™ Savings, 8. Cost of eProvisioning, and 9. Total Savings. The main content area is titled 'Indirect Costs' and contains the following text: 'Indirect costs are associated with the consequences of manual inefficient and error-prone IT provisioning. While some of these may be hard to quantify, they are certainly significant. There is also a clear, high positive correlation between manual IT provisioning and the odds that your company will encounter these costs.'

Yearly cost associated with security breaches (unauthorized insider access, telecom fraud, sabotage of network and data, and spoofing).	\$	100,000.00	i
Amount of IT staff time spent troubleshooting setup problems associated with locating and fixing incorrectly configured IT resources / services.		16%	i
Annual cost of additional IT staff time associated with locating and fixing incorrectly configured IT resources / services	\$	345,600.00	i
Amount of IT staff time spent providing user support for incorrectly configured IT resources / services, or on followup calls providing service for incomplete / incorrect IT provisioning		17%	i
Annual cost of user support time spent on incorrectly configured IT resources / services, or on follow-up calls providing service for incomplete / incorrect IT provisioning.	\$	43,200.00	i
Exit costs - the amount of money spent on resources that an ex-employee has not yet returned or stopped using (like cellphone, email, internet access, etc.) - per ex-employee		100	
Number of employees that left in the last year:		2,000	
Total Exit Costs:	\$	200,000.00	
Total Indirect Costs:	\$	688,800.00	

At the bottom of the interface, there are navigation buttons: 'Back', 'Next', 'Reset all sample values', and 'Reset this page'. A 'Print Report Compare!' button is also visible. A copyright notice at the bottom reads: 'Copyright 2001, Business Layers, Inc. The user agrees not to re-distribute any components, source code, or any other downloaded content without the expressed written consent of Business Layers.'

Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 6 –Summary

Business Layers™ Making People Productive from Day One™
Return on Investment Calculator

Summary

Total direct IT Costs:	\$	756,000.00
Total lost productivity:	\$	2,062,500.00
Total lost opportunity:	\$	7,200,000.00
Total indirect costs:	\$	688,800.00
Total:	\$	10,707,300.00

Navigation: [Back](#) [Next](#)

Buttons: [Print Report](#) [Compare!](#) [Reset all sample values](#) [Reset this page](#)

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Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 7 – Projected Savings if E-Provisioning were Utilized

The screenshot shows a web-based application window titled "Flash" with a menu bar (File, View, Control, Help). The main content area is titled "Business Layers™ Making People Productive from Day One™ Return on Investment Calculator" and "eProvisioning™ Savings". A sidebar on the left lists navigation steps 1 through 9, with step 7 "eProvisioning Savings" highlighted. The main area displays the following data:

Percent savings gained by automating and streamlining your IT operations by eProvisioning:	<input type="text" value="15"/> %	i
Ignoring indirect costs, savings provided by eProvision Day One:	\$ 1,502,775.00	i
Including indirect costs, savings provided by eProvision Day One:	\$ 1,606,095.00	
Savings per change:	\$ 356.91	

At the bottom, there are navigation buttons: "Back", "Next", "Reset all sample values", and "Reset this page". A "Print Report Compare!" button is also visible. A copyright notice at the bottom reads: "Copyright 2001, Business Layers, Inc. The user agrees not to re-distribute any components, source code, or any other downloaded content without the expressed written consent of Business Layers."

Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 8 – Cost of deploying a Business Layers solution

Using the Business Layers solution assumes the organization has a directory service in place.

The screenshot shows a web-based application window titled "Flash" with a menu bar (File, View, Control, Help). The main content area is titled "Business Layers™ Making People Productive from Day One™ Return on Investment Calculator". The current step is "Cost of eProvisioning™".

On the left, a navigation menu lists steps 1 through 9, with step 8 "Cost of eProvisioning" highlighted in green. Below the menu are links for "Print Report" and "Compare!".

The main area displays a table of costs:

Cost of software platform: (single server)	\$	45,000.00	
Num. of eProvision Modules (ePMs)		<input type="text" value="3"/>	?
Cost of profile per ePM:	\$	9.00	?
Cost of profile for total number of employees:	\$	242,500.00	
Cost of professional services:	\$	287,500.00	?
Annual administration costs:	\$	32,000.00	?
Total cost of product:	\$	607,000.00	

At the bottom, there are navigation buttons: "Back", "Next", "Reset all sample values", and "Reset this page". A copyright notice is visible at the very bottom: "Copyright 2001, Business Layers, Inc. The user agrees not to re-distribute any components, source code, or any other downloaded content without the expressed written consent of Business Layers."

Appendix F: Sample ROI using the Business Layers ROI Calculator for Alpha University
(continued)

Step 9 – The Payback Period

It is important to note that this model does not display the payback period for the deployment of the directory service itself, however, that can be extrapolated from the information provided.

The screenshot shows a web-based application window titled "Flash" with a menu bar containing "File", "View", "Control", and "Help". The main content area features the "Business Layers" logo and the tagline "Making People Productive from Day One™". Below this, the text "Return on Investment Calculator" is displayed. A large, semi-transparent blue number "1" is centered in the background. On the left side, a vertical navigation menu lists nine items, with "9. Total Savings" highlighted in green. The main results area displays the following data:

Total Savings	
Savings realized by eProvision™ Day One:	\$ 1,606,095.00 per year
Cost of eProvision Day One:	\$ 607,000.00
Total savings:	\$ 999,095.00
Payback period:	4.53 months

At the bottom of the interface, there are several buttons: "Print Report Compare!", "Back", "Reset all sample values", and "Reset this page". A dark blue button with white text says "Send your results to Business Layers". A small copyright notice is visible at the very bottom: "Copyright 2001, Business Layers, Inc. The user agrees not to re-distribute any components, source code, or any other downloaded content without the expressed written consent of Business Layers."