



## Business Challenges and Innovative Application of Technology in Higher Education

### Student Services System – Next Generation

*Transforming and modernizing the administration of your institution and taking costs out of the system*

#### Abstract

Another inflection point has been reached in the evolution of student systems. The combination of factors, such as the broad adoption of open standards, the emergence of open source application software and the availability extended services powered by Internet technologies, are shaping the next generation of application systems.

The next generation student system, the Student Services System, will be available as open source code and with an open architecture that will facilitate the quick and easy addition of improved functionality within applications. Standards-based integration middleware will provide secure, seamless connectivity with extended and disparate resources and services in the creation of innovative, student-focused business processes.

Colleges and universities that are considering the replacement or upgrading of their current student system should cast an eye toward the future while looking for answers to questions such as, "Should we continue to follow a single-vendor, ERP strategy? Is the consolidation of application software providers going to be beneficial or more costly in the long-run? Should we be investigating open source alternatives for major business applications?"

This paper is designed to provide institutional decision-makers with an insight into the next generation student system – a *services* system -- that promises to reduce costs and provide the agility, flexibility and vendor independence colleges and universities are seeking.

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#### Executive White Paper Series

Executive White Papers provide valuable insights into the innovative application of technology to solve business problems that are confronting colleges and universities. The papers should serve as a helpful resource to aid Chief Financial Officers (CFOs) and Chief Executive Officers (CEOs) in discussions with institutional Chief Information Officers (CIOs) in the exploration of new methods and processes for reducing administrative costs.



## Business Challenges and Innovative Application of Technology in Higher Education



*Student Services is  
the next generation*

*Development will  
follow the community  
source mode*

*Student Services Bus  
will turn the SIS into a  
Student Services  
System*

*Student Services will  
support seamless  
integration and  
remove boundaries*

*Community will shape  
the ecosystem*

*Cost of participation is  
low and risks minimal*

### Executive Summary

The name, Student Services System, reflects the evolution from a *records* system to an *information* system to one that is designed around the concept of *services*. The Student Services System will be comprised of two major components: first, a Student Information System (SIS) with a complete set of integrated business modules (e.g., Admissions, Student Accounts, etc.), and secondly, integration middleware, referred to as a Student Services Bus (SSB).

The fully-functional Student Information System will be built on an open, modern architecture -- e.g., open standards, platform independence, Web-based, Java with J2EE -- and will be freely available as open source code. The SIS base code will be seeded by either a commercial software house or an institution, or a combination of both. Development will follow the successful community source model for obtaining funding, creating a governance structure and providing date-driven project management.

The Student Services Bus will be a deployment a standards-based enterprise services bus customized for the higher education market. The SSB will utilize open standards and leverage the extended capabilities of the Internet to interconnect the SIS with disparate applications and student-related services, internally and externally.

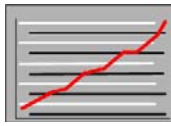
The Student Information System in combination with the Student Services Bus will provide an open and flexible platform for the seamless integration of new services with core functions. The open integration design will free institutions to think and act beyond the boundaries of traditional student systems and beyond the notion that all functionality needs to be delivered by a single provider.

For an open source student system to be successful, it is critical to establish both a viable business model and an active developer community. The community will shape the ecosystem and develop the mechanisms for pooling resources from like-minded institutions, commercial service and support companies, standards groups, and partners that share a common vision of the next generation student system.

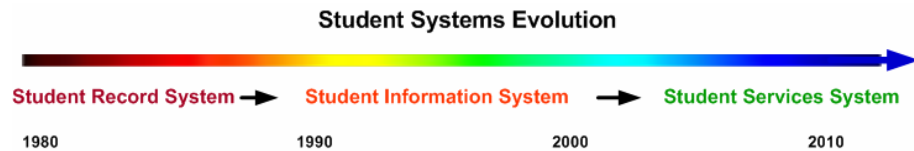
An Open Source Student Services System community is now in the formative stage. For institutions that elect to participate, the cost of entry and the risks will be minimal. The potential benefits, however, may be significant. The Student Services System has the potential to help solve the "integration" issue and provide the flexibility, vendor-independence and cost reductions that colleges and universities are seeking.



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### Vision -- Student Services System



#### *First Generation Student Records*

First generation student systems were “record” systems that were designed to support to back-office functions. In order to ease the issues of data integration, institutions recognized the importance and value of a shared, common data model and pursued a strategy of purchasing pre-integrated software suites from a single provider.

#### *Second Generation Student Information*

By the mid-1990s colleges and universities started implementing enterprise resource planning (ERP) solutions as a vehicle for improving internal business processes, sharing information across the institution and solving the Y2K problem. At the same time colleges and universities started exploited opportunities being enabled by the Internet and the Web, and student “information” systems were adapted to provide students and faculty with self-service access to on-line information and personal transactions.

#### *Third Generation Student Services*

The basic principles of a common data model, self-service access and integrated information sharing still form the foundation for the next generation student system. However, the next system will be redefined with a service-oriented architecture (SOA) that includes a standards-based integration platform. The new capabilities will allow institutions to respond quickly to business opportunities enabled by interoperability with extended “services” available across the institution and externally via the Internet.

#### *Service-Oriented Architecture – Universal Strategy*

All of the major applications software providers have announced the adoption of SOA as a strategic direction -- e.g., Oracle with Project Fusion. This transition in design signals not only a change in architecture but also a recognition that increasingly all functionality will not be provided within the confines of the core student system. With all functions treated as services, colleges and universities will look for the agility to integrate with resources beyond the campus and for opportunities to create cooperative business processes that extend out the supply chain.

#### *Future – student- centric applications and extended services*

The next generation student systems will center on the student as part of the learning experience in addition to providing improved business efficiency. The personalization and aggregation of information, as illustrated by portals and electronic student portfolios, represents a first stage in the creation of student-centric business processes that will exploit an extended set of services.



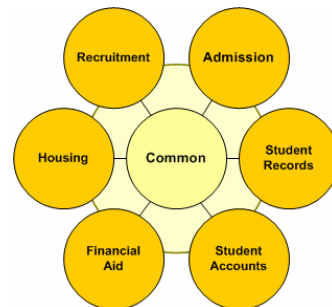
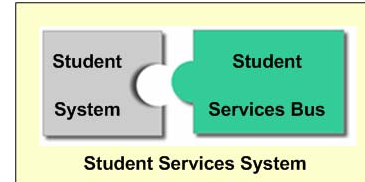
## Business Challenges and Innovative Application of Technology in Higher Education



$SIS + SSB = SSS$

### Student Services System

The Student Services System is comprised of two major components: first, a Student Information System (SIS) with a complete set of business modules. The SIS becomes a Student Services System with the attachment of integration middleware, referred to as a Student Services Bus (SSB).

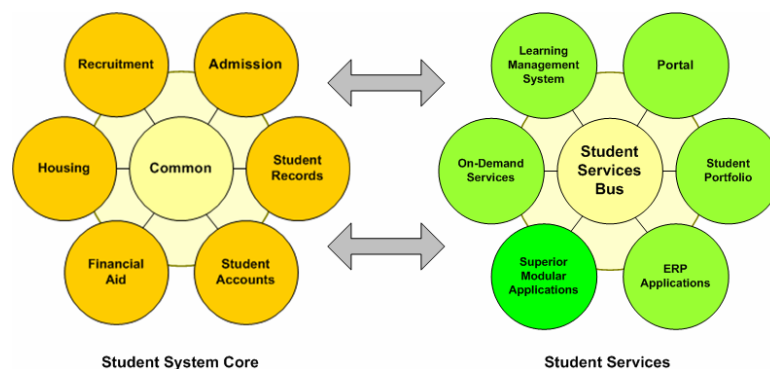


The core student system could be an institution's existing legacy packaged or home-grown SIS, an ERP solution, or an open source student system. The SIS application modules are designed in a traditional manner around a common data model and provide basic functionality in an integrated manner within the application suite.

*Functional services will reside on and off campus*

In the future, all student-related functions will not be managed within a single SIS, and all functional services will not reside within the same computing environment or even remain resident on campus computers. Instead, the new student services model will support functionality in the most appropriate and cost-effective manner.

Figure 1 -- Student Services Model



*Customers will receive customized, superior functionality and value*

Figure 1 provides a sample illustration of integration with services that exist outside the core student system. For example, there may be more urgency for integration of the Student Records module with scholarly applications, such as Learning Management, than with business sub-systems, such as Housing. It is also reasonable to expect that modules, such as Housing, will be provided as external "superior applications" and seamless integration with the core student system accomplished via the Student Services Bus.



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*I want to be able to select the best course registration system knowing it will work with my current student system*  
 Rita Owens

### Extended Services – Wave of the Future

Applications that are widely used today, such as Google, eBay and Amazon, are all available as services that reside out on the network. The primary reasons that users select these services are convenience, superior business functionality and value proposition.

We are in the midst of a paradigm shift where specialty companies will develop superior, highly-focused applications as services that utilize the Internet for delivery. A *services* platform will allow “best-of-breed” functionality to be obtained from many sources and at an optimal cost point. To functional customers, such as Rita Owens, Associate Academic Vice President for Technology at Boston College that means, “I want to be able to select the best course registration system knowing it will work with my current student system.”

Figure 2 -- Extended Services Model

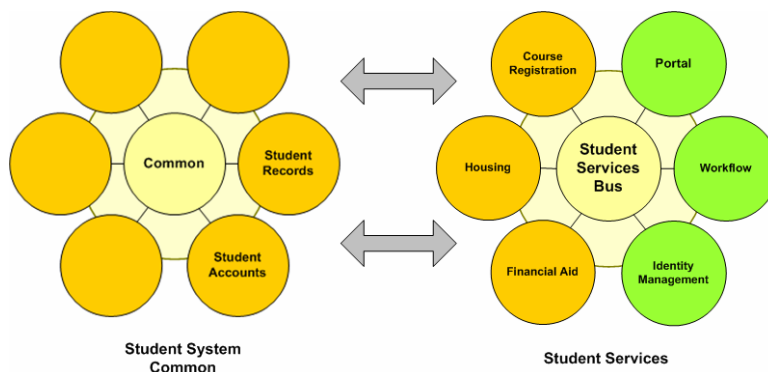


Figure 2 depicts externally hosted services and functions working cooperatively with the core student modules, but also conveys the concept of a base Student Services System; one composed of a common database model, an open architecture, and the limited core tied to the SSB. This base would allow colleges and universities to begin to overcome integration issues that have been holding back adoption of a distributed approach.

*Today's extended enterprise needs a fundamentally different technology approach which facilitates customization as well as seamless integration with third-party solutions.*  
 Dave Duffield

We are approaching an important inflection point. We are entering an era that will be characterized by distributed execution of functionality as a means of attaining cost-effective and efficient results. Dave Duffield, founder and past chairman of PeopleSoft, recently validated this view by stating, “Today’s extended enterprise needs a fundamentally different technology approach which facilitates customization as well as seamless integration with third-party solutions.”





## Business Challenges and Innovative Application of Technology in Higher Education



### Student Services System – Extended Vision

The new open source Student Services System will allow institutions to think and act differently; to break out from the limitations imposed by rigid system architectures. Everything should be up for grabs – how business models are designed, how new applications are cobbled together, and how new functionality is created and implemented.

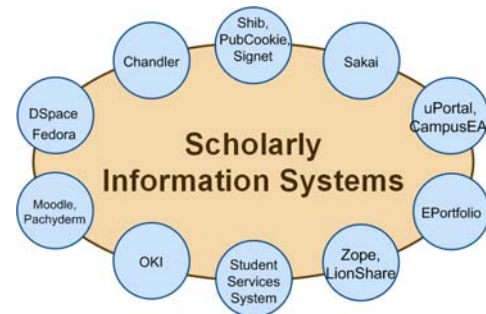
*SaaS – shift to  
software-as-a-service  
business model*

The development of open source enterprise applications from scratch, such as a Student Services System, will be difficult to accomplish due to the complexity of the software. However, we will see application software being donated as open source code by institutions and smaller commercial software providers. These entities recognize that the best way to compete in this era of consolidation and market domination is to contribute code to an open source community and shift their business model to software-as-a-service (SaaS).

With a SaaS business model, software providers will sell an annual subscription service to support an open source application. The software will be free and institutions will be free to purchase support from an array of service providers. The advantage for donor of the open source software will be familiarity with the code and continued involvement in product development within the community.

*Building unique  
applications with open  
source components*

Institutions will be able to take component pieces and build their own special systems. At Educause 2004 Dave Lambert from Georgetown University provide his vision of a scholarly system, of which the Student Services System would be a component along with a whole series of open source application being developed by the Higher Education community.



*Everything needs to  
happen quickly*

The open, standards-based architecture and integration platform should encourage the creation of both commercial and open source applications modules with well-defined interfaces. Instead of worrying about the entire system, open source developers at institutions and commercial companies should be able to respond to new requirements quickly, and be able to create and test smaller, specialized modules quickly. In turn, customer should be able to quickly add new functionality without the need to rip and replace major portions of the student system.



## Business Challenges and Innovative Application of Technology in Higher Education



### Building a Student Services System Community

The proposed Student Services System addresses the issues of cost reductions and the provision of modern application integration architecture. But before a group of institutions can begin to consider the creation of an open source, student system alternative, an active open source community needs to form.

*It is going to happen!*  
Carl Jacobson

The first step has been initiated; a representative group of colleges and universities met at Educause 2005 in Orlando. The first comment at the meeting was by Carl Jacobson from the University of Delaware, "It is going to happen!" The 40 or so attendees were in agreement.

*Shared vision of best  
of breed capabilities*

These institutions all share a common vision and interest – a student system that will replace the current system with "best of breed" capabilities, will leverage the combined resources of a community of institutions, and will be based on open source, free software.

*community" is equally  
important as code*

But we have learned a valuable lesson from prior open source initiatives such as uPortal and Sakai -- "community" is equally important as code, and the community must extend beyond the technical contributions of a group of dedicated and talented developers. An active open source community will not sprout up overnight but rather will increasingly gain traction as an ecosystem evolves around the project.

*Two Major Issues:  
Leadership  
Code Evaluation*

Very soon the Student Services System project is going to have to collectively deal with issues such as organization and leadership, funding, sponsorship, pooling of resources, role of commercial service companies, determination of standards, involvement of trading partners, open source licensing model and so on. The first two major issues that must be addressed are: formation of a leadership team and the evaluation of potential code contributions.

*Code contributors  
have stepped forward*

Starting with existing code is easiest and best way to jumpstart the project and to shorten the time to reality. In the two weeks following the initial meeting in October, 2005 in Orlando, two commercial software providers and two institutions have come forward offering their Java code for the base system. Other institutions have offered to contribute modules.

*Project to follow  
community source  
model*

The project leadership and direction will come from institutions, not commercial partners, and funding should follow the community source model. That means a significant contribution of personnel and financial resources will come from a small core group of institutions with a larger group of schools making smaller financial contributions.



## Business Challenges and Innovative Application of Technology in Higher Education



### Student Services System Partner Network

With the open architecture and open integration capabilities provided by the Student Services System, increasingly functional components and extended services will be provided by a partner network. As requirements for new services arise, both institutions and partners will have a mutual interest in avoiding sinking more resources and costs into proprietary code to achieve interoperability.

*Third-party commercial partners will be key players*

New beneficial partnership arrangements will develop with third-parties that produce and support superior, functional capabilities for the Higher Education market. Instead of having to look to a single large application vendor to solve the integration issues in order to furnish additional functionality, new opportunities for the business process orchestration should arise with a variety of third parties.

*New breed of intermediary service brokers will emerge*

We can expect the emergence of intermediary service brokers that will act as a conduit for certifying services, managing service level agreements, enforcing and managing service deliveries and ensuring compliance with trust requirements between parties. Service brokers may charge on a per drink basis or with an annual license, and will negotiate with suppliers out on the supply chain, eliminating the need for each institution to act on its own.

For example, today many institutions have already outsourced portions of their student billing systems. Students and parents can query student accounts and make payments using their preferred method. The billing agency in turn maintains information synchronization with the core student system and handles all of the interaction with the banking system and provides customer support.

*The modularity of design facilitates easy substitution of functions*

The Student Services System architecture addresses extended integration requirements directly. The modularity of design allows colleges and universities to select from a number of potential providers without being constrained by proprietary requirements. Thus, one provider can be substituted for another rather easily.

Today as customers when we buy something over the Web, we are often provided with a functional service for the tracking of the delivery of the product. The tracking service is another illustration of the type of external, third-party service that could appear within an institution's application but would in reality there would be a common, reliable service that is available to many institutions.

*Partners can create superior, customizable modules*

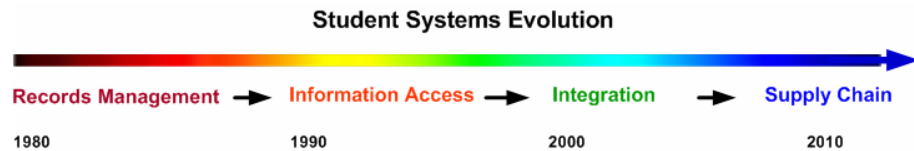
Partners, including open source community members, can create superior, customizable modules that are designed as "services" to be plugged into the open, standards-based application framework.



## Business Challenges and Innovative Application of Technology in Higher Education



### Vision -- Student Services Office Business Model



*Internet and Web  
have redefined  
student service  
requirements and  
expectations*

During the mid-1990s the emergence of high-speed networking, the Internet and the Web altered the nature and composition of student systems as institutions opened their applications to allow self-service access by students in a unified manner.

*Student services as  
functions, not a set of  
physical offices*

This led to the adoption of the "student services" business model – access to all student-related functions in one location and on-line through a single lens -- student portal. As a result, customers (e.g., students, parents, applicants) have now come to view student functions as a cohesive set of services, not as physical offices.

*The student system is  
our face. It has to be  
great!*  
Candy Fleming

As institutional planners begin discussing the next generation of student systems, there is an important thing to keep in mind -- no system has a greater impact on the day to day activities and operations of the campus than the student system. As Candy Fleming, CIO at Columbia University stated, "The student system is our face. It has to be great!"

*Customization and  
uniqueness must be  
supported*

Institutions will not be forced to abandon existing software customization, which is often the case with the implementation of proprietary application suites. Instead, efforts will focus on supporting better business processes. It will include major processes that are common to all institutions, but also processes that are unique to special subsets across many institutions. For example, Nursing schools may have a requirement that will never find its way into a core student system but could be delivered as an external service.

The new student services organization will need to discard the 80/20 rule – i.e., it only takes 20 percent of the effort and cost to provide high-level service for 80 percent of the issues. The big payoff comes in conceiving how to efficiently serve the remaining 20 percent, referred to as "long tail." Figuring out how to serve the tail is the next big area of opportunity for the Student Services organization.

*Satisfying the long tail  
is the next big area of  
opportunity for the  
Student Services  
organization*

As the student *information* system disappears in favor of a student *services* system, the management of the Student Services organization must be ready to seize new opportunities and to provide the leadership to continually reshape the support organization to a dynamically evolving set of delivery mechanisms.



## Business Challenges and Innovative Application of Technology in Higher Education



### **New Student System Considerations**

In establishing requirements for selection of a new student system or designing a Student Services System, it is insufficient to just state system capabilities against a set of existing business practices. The following are some factors that need to be considered.

#### **Cost of Integration**

Proprietary integration methods by software vendors have resulted in expensive maintenance costs that are borne by the institution, making the reduction in the cost of integration a top priority.

#### **Departmental purchase of solutions**

Departments want to be able to select solutions that best meet their functional needs but also are able to interoperate with other applications within a secure integration platform.

#### **Growth and cost of internal application support**

As new services and new business practices are deployed, appropriate support levels must be maintained while lessening the burden on the existing technical staff and reducing overall costs.

#### **Speed of adding business functionality**

The pace of change in business needs is dictating that there must be quicker, simpler, more efficient, and less expensive ways to continuously add new functionality to systems.

#### **Danger associated with vendor lock-in**

As software providers consolidate and options shrink, the dangers associated with vendor lock-in, namely control over price and functionality, need to be an institutional planning priority.

#### **7 x 24 availability**

Students and their parents increasingly need to be able to interact with student services from anywhere and at anytime, around the clock and on weekends.

#### **Commercial Sector Best Practices**

System architecture must accommodate functionality and cost reduction techniques that have proven effective in other industries.

#### **Customization and the Long Tail**

System must be customizable and provide a structure for inclusion of every potential process with a small user base, and every size of institution, down to K-12 and small colleges in developing countries.



## Business Challenges and Innovative Application of Technology in Higher Education

*Have a vision, be  
demanding.*  
Colin Powell

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### **IBM's Vision of Student Services System**

Together open source, open standards and open architecture form what IBM calls an "open approach" -- a powerful combination for the creation of the next generation of applications. It is IBM's vision that the next generation of *services* applications, such as the Student Services System, will redefine the application software industry.

Adopting an open approach is an important strategic step if colleges and universities hope to gain independence from software vendors and do a better job of managing software costs. With an open framework colleges and universities will be on an open path toward attaining the flexibility and interoperability they are seeking.

New applications will focus on serving consumer needs (e.g., students), not simply improving institutional business processes. Institutional customers want the ability to control their own destiny and to reduce costs but they also want to be able to employ the best mix of software, open or proprietary to transform business and learning processes.

Most importantly, they want everything to easily fit together and work together. Open integration standards will make it much easier for small, specialty service providers to participate, and new services will be adopted piecemeal within operating units rather than as a top-down sale.

The Student Services System will allow colleges and universities to adopt a *services* model at their own pace. Real productivity and cost gains will occur with the maturation of process standards and common definitions that will allow interoperability to extend beyond the institution to the end of the value chain.

### ***Open Information***

IBM is committed to the free exchange of information in sponsoring this series of papers.

Each paper represents the point of view of the authors and can be freely distributed and content be reused with accreditation but without the expressed permission of the authors or IBM.

The Student Services System embodies the technology and business paradigm for the next generation of applications – i.e., open source and an open integration and the agility to quickly add functionality and create new business processes with extended services.

IBM believes in the future importance of open source business applications and is demonstrating its commitment by being a good citizen and an active participant in the Open Source Student Services System project.