

An ERP Implementation and Business Process Reengineering at a Small University

Implementing an ERP system teaches small colleges and universities lessons about reengineering business practices

By Ilya V. Yakovlev

Implementing enterprise resource planning (ERP) systems frequently requires organizations to change their existing business practices to fit the new system. Small colleges and universities like the University of Wisconsin-Superior (UWS) face specific challenges and opportunities when implementing an ERP system. UWS learned valuable lessons about reengineering business practices while implementing PeopleSoft Student Administration (SA), lessons most applicable to other small colleges and universities embarking on their own ERP projects.

Background

UWS is a small liberal-arts college in Northern Wisconsin with about 2,700 on-campus students. It is one of 13 four-year universities in the University of Wisconsin System. UWS built its legacy system on a Unisys A-Series mainframe in the 1980s, with several major additions implemented in the 1990s. The SIS supported touch-tone registration, grading, automated billing, degree auditing, and direct lending. Because of the system's proprietary nature, only faculty, advisors, and administrative staff could access it. The SIS also could not handle the increasing demand for Web-based student services and for end-user reporting.

In 1998 the University of Wisconsin System purchased a system-wide license to use PeopleSoft SA. The UWS campus started its implementation with the Admissions module, which tracks prospective students and students' admission status. The module went live in spring 2000. The Student Records module, used for tracking student records, grades, and classes, went live with early registration in spring 2000, and fully live in fall 2000. The two remaining modules, Student Financials — handling fees and student payments — and Financial Aid — managing student loans, grants, and direct lending — also went live in fall 2000.

Based on the implementers' goal of installing the system on schedule and within budget, this project succeeded. Nevertheless, not every part of the project went exactly as planned. The implementers learned many valuable lessons in the process. The biggest challenge was dealing with changes to the business practices that the campus had developed around the legacy system since the 1980s.

SA is a configurable package. Nevertheless, it brings with it many business functionalities employed by other, usually large, schools that cannot be modified. The campus IT staff could have rewritten those functionalities that

departed from its common business practices, but that would have required ongoing maintenance of these customizations. In addition, ERP vendors provide frequent minor patches and occasional major upgrades; any changes to the original system have to be reviewed and thoroughly tested whenever a patch or an upgrade is applied.

The campus had to accept the new way of operating, adopting as many of the new processes as possible to take full advantage of the new system and to minimize the complexity of ongoing maintenance. That meant training end users not only on the new system but also on the new way of operating.

The reengineering experience has been difficult, but also rewarding. Perhaps the biggest lesson learned was that a school needs to be proactive with reengineering and should plan for changes to business processes before implementing a particular module.

The Implementers

The decision to implement PeopleSoft SA was made by a steering committee that included the university's top management and leaders from the university's main student service offices.

The provost appointed the head of administrative information systems (AIS) as the project manager. Four core implementation teams were put together, one for each student service office. The Admissions team included one representative from AIS and two from the admissions office. Two employees from AIS, two from the registrar's office, and one from the advisement office made up the Student Records implementation team. The Student Financials team included one employee from AIS and two from the bursar's office. The Financial Aid implementation team included one employee from IT and two from the financial aid office. Respective office supervisors and many cross-functional participants were also important members of these teams.

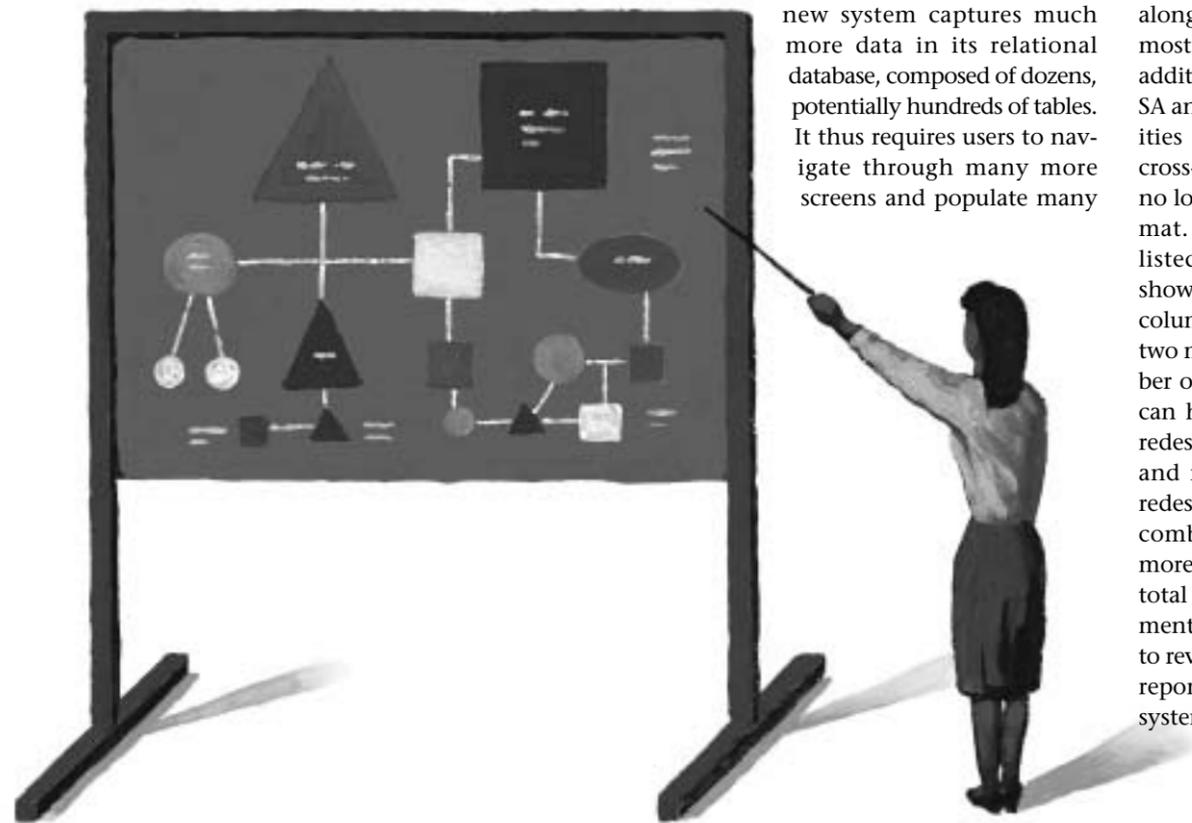
Increased Data and Information

Administrative users quickly discovered that the time needed to enter data increased significantly on the new system. Whereas the legacy system used one or two main data-entry screens and required filling in a dozen or so fields, the new system demanded that users navigate through five to ten screens to complete the same process. The new system captures much more data in its relational database, composed of dozens, potentially hundreds of tables. It thus requires users to navigate through many more screens and populate many

more fields. Entering a student application took one to two minutes on the legacy system. Entering an application in SA takes twice as long. On the positive side, this time decreased from about four to six minutes when the admissions office first started using the new system to about two to three minutes now.

Due to the high number of tables and the importance of accurate data in the new system, users now have to review multiple exception edit reports. The campus IT staff wrote many reports to catch duplicate records and other invalid or unreasonable data. For example, one report displays incomplete addresses when one or more address fields are missing, such as a ZIP code. Another report helps verify that all current students have at least one active address entered in the database. It takes time to review these reports and make necessary corrections to the data in the system. Those who intend to tackle an ERP implementation should plan to spend additional time reviewing such reports and making appropriate corrections to the data.

The reports produced on the legacy SIS could not always be replicated on the new system. In fact, administrative staff along with campus IT staff redesigned most reports to take advantage of the additional data now being collected by SA and of the greater reporting capabilities provided by the system, such as cross-tabs and charts. Some data could no longer be presented in a certain format. For example, one legacy report listed current students. The report showed one line per student, using four columns for first two majors and first two minors. SA does not limit the number of majors or minors that a student can have. Therefore, it made sense to redesign the report to list every major and minor on a new line. End users redesigned many reports in a way that combined information from two or more legacy listings, thus reducing the total number of reports. Future implementers of an ERP system should plan to review and redesign all of their legacy reports to take advantage of the new system.



Although administrative users now use more screens and enter more data, this new data helps produce meaningful, accurate reports for the university's management at various levels and for the University of Wisconsin System, the central authority over our campus. In addition, administrative users are becoming more comfortable with the new system and more facile with the new screens and processes.

Data Sharing

Administrative users from the admissions, registrar's, bursar's, and financial aid offices had to change the way they operate with respect to other offices. While the legacy SIS provided few data-sharing capabilities, SA took data sharing to an enterprise-wide level. A prospective student's address, entered in the admissions office, would be visible by the other three offices instantly. That has significant implications on other offices. For example, an incorrect entry in an address field could prevent the student from receiving an important mailing from the registrar's office. An incomplete record of a transfer student's credits from another school could prevent a student from competing for certain types of financial aid.

Admissions data entry became especially important, as the point at which most demographic data is captured. Addresses entered at this point may be used to send important promotional mailings such as registration deadlines and tuition information. The exact spelling of the student's name is used later to create the student's account for Web services, Web portal, and e-mail accounts. The Web services account grants access to registration, grade lookup, unofficial transcript, degree audit, and other student data. The Web portal is used as part of several classes. The e-mail account is often used for important communications from advisors, instructors, and administrative staff. Changing an incorrectly spelled account would be a lengthy process.

The admissions office also enters transfer credit and GPA data important in determining proper student classification, the amount of financial aid stu-

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dents receive, and the set of classes in which they will be eligible to enroll. A late removal of a hold on a student's record, for example due to a misplaced transcript, can prevent a student from registering online.

Duplicate Records

The legacy SIS tolerated duplicate entries. Most student data were stored in two tables, so when a duplicate entry was discovered, merging two records in one table and several records in the other wasn't difficult. SA is far less tolerant of duplicates. This ERP system's relational database potentially requires modifying dozens of tables to merge two student entries. Over time the system generates hundreds of records in dozens of tables for every student, and eliminating duplicate entries is a major task.

Administrative users and IT staff had to design processes for detecting duplicate records and eliminating them. Much prospective student data is taken over the phone, and student names and addresses can be misheard easily. Therefore, duplicate records are likely to be generated at this one point. Because many prospects never follow through and become students, and because the number of prospective entries is large (thousands per term on this campus), administrative users and IT staff agreed to accept duplicates at this stage. They catch most of the problems when prospects apply for admission to the school and supply more accurate data on paper.

The IT staff designed an exception edit report that tries to match student addresses, names, birth dates, and social security numbers in various combinations to detect as many duplicates as possible. This report could not catch all

duplicates, as names are frequently misspelled and addresses are formatted differently. Moreover, prospects are not required to provide their social security numbers. Therefore, the report cannot rely on that field to eliminate duplicate prospects.

The campus IT staff implemented a third-party system, FirstLogic, that formats addresses in accordance with postal regulations when entered into the system. As a side benefit, this system helps discover duplicates by making the address fields consistent. For example, the duplicate detection report could miss two entries because the word "street" was formatted as "St" in one address record and as "Street" in another. FirstLogic now replaces any variation of "street" with "St" per postal regulations, thus enabling the report to catch more duplicates.

Time Dimension to Data

The legacy SIS recorded the most recent information about a student. It kept only the latest mailing and permanent addresses, recorded only the latest major. SA added a time dimension to most records. For example, student and faculty addresses and names now are inserted and tagged with a specific date. Future dates can also be used, so offices had to redesign the forms they have students and faculty fill out to capture when this change will occur or whether it has already occurred.

The legacy screens required data entry operators to overwrite the information currently stored. The new system calls for insertion of data rows — a major change in operation requiring significant retraining and rethinking for administrative support staff from all offices.

Most dated entries are straightforward, while others require careful analysis. For example, if a student drops classes early in a semester, a certain percentage of class fees may be refundable. However, the date used to record the drop must be examined carefully to ensure that it is the exact date when the student officially dropped the classes, not the date when the student signed the form or today's date.

Legacy Data

Not all legacy data could be migrated to the new system cleanly. Because the SIS did not have a time dimension to data, much of it had to be recreated manually. For example, administrative support staff had to enter titles for certain courses and the dates when they changed. They also had to correct the data for certain returning students. Specifically, they had to indicate that a student first was an undergraduate student before becoming a graduate student on this campus. The data migrated from the legacy system provided only the latest program of study.

Web-Based Services

SA enables the delivery of many services over the Web. Students can now register for classes using E-Hive, a Web-based interface. Because of school policy, a student's enrollment period is usually determined by classification: seniors can register before juniors, juniors before sophomores, and sophomores before freshmen. Therefore, students first have to log in to check the date and time when their enrollment period starts.

Once they become eligible to enroll, students can indicate the classes in which they wish to enroll and initiate a registration request. Some classes may be full by the time a student places the request, or a student may not have fulfilled the necessary prerequisites. A student may also have a registration hold on record, caused by an outstanding parking fine or a library fee, for example. The system checks the prerequisites, current enrollment, and the capacity of a class, and either confirms enrollment or rejects the enrollment request and provides instructions on how to remedy the problem.

Web-based services required the campus to redesign the way student accounts are assigned. In the past students registered in person at the registrar's office and received an e-mail account after their first registration. With SA, students have to have an account before they can register online — and not simply an e-mail account. The new account grants access to SA's

Web-based interface (registration, grade lookup, degree audit, and unofficial transcript), Web portal (for class-specific activities), and e-mail. The campus IT staff designed a process to create just one account for all three types of services, but is still working on the details of password synchronization and account changes among the three systems.

UWS was one of the first schools in the United States to use SA Web-based services. In its first releases, SA's Web-based interface required several modifications. For example, the campus IT staff had to reword unclear messages displayed by the system and modify the way information appeared on the screen. Later releases from the vendor fixed many of the interface's deficiencies. Aspiring implementers should be prepared to correct errors in an ERP system if acquiring one of its first versions. Asking the users for prompt feedback when they encounter problems makes for faster fixes, too.

Maintenance

ERP vendors release periodic patches and upgrades. SA is no exception. Any change to the system requires thorough testing to ensure that the affected functionalities remain operational. Schools often make modifications that correct

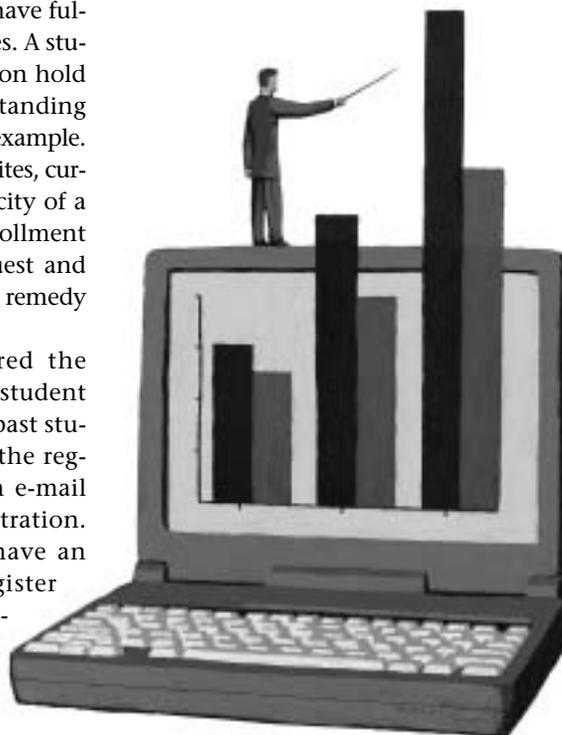
unacceptable functionality or add missing functionality to the system. Whenever a patch or an upgrade is applied, these customizations have to be reexamined, reapplied, and tested. Therefore, customizations are highly undesirable, as they complicate future maintenance of the system.

Schools can expect to patch and upgrade their systems frequently, at least quarterly. Many changes to state and federal regulations, especially those concerning student financial aid, drive the releases of upgrades. They usually must be applied promptly to comply with the regulations.

Administrative offices must select good testers and allocate times when they can test the system without significantly disrupting operations. UWS IT staff first applies patches and upgrades to several laptops containing the test environment, which represents a complete copy of SA along with the latest version of the database. Administrative users can then borrow these laptops to conduct testing at their convenience. Because patches and upgrades usually have to be applied promptly, the testing effort can't take very long. The implementers at UWS try to complete all testing within one week after patches have been applied to the test environment.

IT staff must take the system down to apply patches. UWS IT staff found that the best time to apply patches is over a weekend. That minimizes interruption to Web-based and other services provided by SA and allows for recovery time before the next Monday. UWS administrative support staff commonly come in on weekends to finish outstanding tasks, so UWS IT staff must coordinate carefully with all offices in bringing the system down. A representative from the IT staff informs the entire campus through an e-mail whenever system down time is anticipated.

Major version upgrades can change delivered functionality significantly. End users may need to attend training on the new version of the product to learn new features and new ways of performing tasks. Offices should plan for continual training, whether on site or off.



ERP projects are notorious for increasing staff turnover. Implementers should plan to cross-train all users and IT staff to help mitigate the effects of potential staff departures. The top management at UWS strove to retain all implementers. Nevertheless, one systems programmer left during the implementation, and one financial-aid specialist transferred to another department following the implementation. A review of retention policies can help keep valuable staff.

School Culture

ERP databases require that data about every person be tagged with a unique identifying number. Although users can search for a person in the system using last and first name, the unique identifier is one sure way of locating a student's or an employee's record. Because UWS keeps track of both students and employees in SA, administrative users had to learn to distinguish between the two.

Even though numbers will identify everyone on campus, that doesn't mean the school's culture has to change. Unique IDs are now used everywhere, but the implementers at UWS designed mailings and other communications with students, faculty, and staff in a personalized way that conveys the warm culture of the school. To help alleviate anxiety during the first Web-based registration, the registrar's office allowed in-person registration for those students who didn't want to register online. This measure, among others, helped the school promote the system, yet reduce stress and anxiety.

Lessons Learned

The major challenge in reengineering business processes was to forget the traditional way of doing things and become open minded about the new functionalities that SA offered. Many of these functionalities improved the way the campus operates, although some did not fit our small campus very well. Some could be reconfigured, but users had to adjust to those that could not.

Implementing an ERP system on a small campus provides a challenge as well as an opportunity. Small staff and low compensation add to the imple-

mentation's difficulty, of course, but a small campus also means short reporting lines and versatile staff. Other implementers at small campuses should use these factors to their advantage.

Decisions about changing processes, sending staff to training, or setting the implementation schedule can be made faster on a small campus. Consultants will be needed, but their numbers can be minimized by tapping highly versatile staff. Also, internal staff should have additional powers to make decisions.

Small campuses can keep their implementation groups small and encourage cross-training. In this way, administrative users become more aware of how their work affects others and proactive in changing business practices to fit the new system.

It is especially important for a small campus to adjust its business processes to fit the new system rather than customizing the system to fit existing practices. UWS chose to apply very few customizations, as the university's IT staff were already overloaded with existing tasks and could not take on the additional maintenance.

Critically, the campus community — including faculty, students, administrative staff, and top management — was

informed that the new system would require changes to how they enter data and receive information. A new student administration system will likely have students register for classes and receive grades on the Web. Faculty should be prepared to view and print class rosters and enter student grades on the Web. Administrative staff should expect to review more reports, enter more data, and spend more time doing so.

Users of the new system at UWS had to learn a lot of new terms. For example, a screen is now called a panel; a date-specific entry, a row; a shortcut to a particular panel, a favorite. Implementers found it useful to use the new terms exclusively during on-campus training sessions to help the transition process. The new terms became very familiar after the first few months.

The implementers ultimately discovered that many more business processes would need reengineering after the system went live. Because the campus is so small and the system so large and complex, a limited amount of testing was accomplished. Being proactive and completing as much business processes reengineering as possible before the system goes live is crucial in an ERP project. Future implementers should plan for

Further Reading

■ Common issues that affect most ERP implementations

Bingi, P.; M. K. Sharma, and J. K. Godla, (1999). "Critical Issues Affecting an ERP Implementation," *Information Systems Management*, 16 (3), 1999, 7-14.

■ Lessons from an ERP implementation at another university

Hochstettler, T., et al., "Simultaneous Process Reengineering and System Replacement at Rice University," *CAUSE/EFFECT*, 22 (3), 1999, 9-17.

■ A model specifying those things that must go right in order for an ERP implementation to succeed

Holland, C. P., and B. Light, "A Critical Success Factors Model for ERP Implementation," *IEEE Software*, 16 (3), 1999, 30-36.

■ Lessons from another ERP implementation at a small college

Jaacks, G. E., and M. Kurtz, "Lessons Learned in Process Reengineering at a Community College," *CAUSE/EFFECT*, 22 (4), 1999, 26-29, 33-35.

■ Practical guidelines for ERP implementers in higher education

McCredie, J., and D. Updegrave, "Enterprise System Implementations: Lessons from the Trenches," *CAUSE/EFFECT*, 22 (4), 1999, 9-16.

■ Lessons from the IT perspective following the ERP implementation at UWS

Yakovlev, I. V., and M. A. Anderson, "Lessons from an ERP Implementation," *IT Professional*, 3 (4), 2001, 2-7.

multiple test cases and for significant business process reengineering.

Many of the changes to the business processes required administrative offices to capture more data, use more entry screens, and spend more time entering data and reviewing reports. Future implementers should plan to hire temporary additional staff to help during the implementation. They should also plan for additional staff for those areas most strained by the changes brought about by the new system.

Choosing the most flexible and the highest-ranking personnel for business process reengineering ensures that the new ways of conducting business are accepted and planned for. The high rank of the personnel involved prompts acceptance of these changes and their successful implementation in respective offices. Not all processes will be reengineered ahead of time. Some problems will be discovered after the system goes live. In those cases the implementers must be able to drop everything and implement a rapid change to a process overlooked in the initial reengineering effort.

A systems implementation project should maintain good public relations. Implementers may find themselves having to sell the system to reluctant participants and end users. There is no easy answer to this problem. Those users averse to change and to technology in general will feel especially resentful. Implementers can help by patiently addressing their needs and concerns. Prompt technical support is a must. Implementers should try to involve representatives from all groups on campus in the implementation to ensure acceptance of the system and the reengineering efforts.

Most people at any school implementing an ERP system will realize a benefit from the new system. The implementers must emphasize those benefits over the costs of implementing the new system. Faculty members who do not like to enter student grades electronically, for example, may appreciate entering grades from anywhere in the world — and heading for a vacation earlier than in the past.

At UWS advisors no longer have to

deal with unofficial transcripts or degree audits in paper form, as they are now available on the Web. Instructors' class rosters are available online. Students can look up their final grades as soon as they are issued. Administrative support staff can locate student records faster when somebody inquires about them. They can also produce their own reports and mailing labels without requesting help from the IT department.

ERP implementations often eliminate administrative positions, but on small campuses that shouldn't be an issue. This knowledge should help alleviate the stress of many reluctant participants. In addition, the system greatly upgrades administrative skills. However, the skills of existing administrative and IT staff will need to improve significantly to use the system effectively.

Your implementation might be difficult, but it should result in a better system for the campus, as it did for UWS. Eventually, schools that choose to implement an ERP system should realize many of their best features. UWS is only beginning to approach that stage, but many of the benefits have already become evident:

- Students now have access to rich Web-based services, allowing administrative support staff to devote more time to other activities. They can enroll for a course instantly and see the effect this course has on their degree progress by using the online degree audit. They can immediately see their financial aid, fees, and any holds they may have. UWS is about to enable a credit card payment feature, which will be especially useful to distance-learning students.
- Advisors now have access to an online list of advisees. They can also run degree audits and unofficial transcripts to monitor their advisees' academic progress.
- Instructors can choose to receive class rosters online. They can also opt to enter final grades using the new system. Some instructors are about to start using specialized online reports that list special populations of students, such as students in the honors program. In the past they had to ask

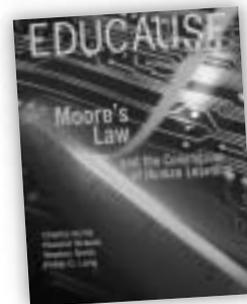
the IT department for such a list and wait for it for several days.

- Understandably, paper reports become obsolete the moment they are printed out. Over time the new system should eliminate many manual tasks and instantly provide current and accurate information to students, faculty, advisors, and the university's decision-makers.

The success of the ERP implementation at UWS results from the dedication and expertise of its implementers, and to excellent support from the university's top management and from the University of Wisconsin System. Other small colleges who can muster that level of support and appropriate resources can expect the same success in their ERP implementations. *e*

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