

## **A Customized ERP/SAP Model for Business Curriculum Integration**

**Todd Johnson  
Alden C. Lorents  
James Morgan  
Jon Ozmun**

College of Business 15066  
Northern Arizona University  
Flagstaff, Arizona 86004, USA  
[james.morgan@nau.edu](mailto:james.morgan@nau.edu)

### **ABSTRACT**

The use of ERP systems can provide a variety of benefits in a business school curriculum. Among the most important benefits is the ability of ERP systems to serve as a focal point for integration of knowledge across functional areas. This paper describes one school's experience with the use of ERP systems in core business classes with particular focus on a promising integration technique based upon the development of a hypothetical example company. A common general description of the company's products, organizational structure, and operations is used across multiple core courses. An SAP instance is populated with sample data designed to illustrate key concepts and case study materials are used to set the context for analysis of the company's data.

**Keywords:** Business Curriculum, ERP, SAP, Curriculum Integration

### **1. INTRODUCTION**

#### **1.1 The Need for Integration in Business School Curriculum**

Over 15 years ago Porter and McKibbin (1988) emphasized the need to adapt business curriculum to assure that we develop graduates with an integrated understanding of business processes and the ability to work effectively in teams to solve key business problems. Closs and Stank (1999, p. 59) note that business has abandoned the "vertical, functional organizational structure characteristic of traditional procurement, manufacturing and physical distribution operation in favor of a more horizontal, cross-functional structure." They suggest that business school curricula need to mirror this change.

In response to this need, a number of researchers have proposed a redesign of the core business curriculum to break down disciplinary silos (Stover et. al., 1997; Ryan and Luthy, 2000; Bailey, Chow and Haddad, 1999). The University of Idaho (Stover and Byers, 2002), Babson College (Gwin and Gwin, 2000), and a number of other schools have made systematic changes across their entire business core intended to achieve a higher level of integration.

Other integration efforts have focused on a subset or "block" of courses within the core (Still and Petty, 2000) and have often centered on a theme, such as, experiential

learning (Michaelson, Hobbs and Snead, 2000) or entrepreneurship (Kennedy and Russell, 2002). Frings, Prinzing and Schneider (2000) suggest that block level integration can take on a number of forms requiring varying degrees of coordinated faculty effort. A highly coordinated approach might require joint teaching of formerly separate classes with team teaching and a single grade. At the lowest level of required coordination, a block program might simply require the coordination of definitions and examples and the use of integrating cases across otherwise independently taught classes. Block level integration can be undertaken with substantially less college wide faculty buy-in and thus may be a catalyst for incremental curriculum change.

#### **1.2 ERP Systems as a Theme for Integration**

Hammer (1999) contends that the use of ERP software forces firms to become integrated enterprises that demand strong understanding of key business processes and very high levels of teamwork. Gale (2002) suggests that "when used appropriately ERP software integrates information used by the accounting, manufacturing, distribution, and human resources departments into a seamless computing system." Further, a survey by Duplagia and Astani (2003) found that integration of function areas' information systems was the most important reason for firms adopting ERP systems and a number of studies of the impact of ERP systems have found cross-functional integration to be a key to a successful implementation (Palinswamy and Taylor,

2000; Prmkumar, 2000; Shanmugam, Forcht and Busing, 2000).

The effectiveness of ERP systems as an integrating mechanism in business suggests that ERP software might successfully be used as an integrating mechanism in business college curricula. In discussing the ERP related curriculum at Louisiana State University, Watson and Schneider (1999) suggest that "after a few years of a traditional stove-pipe business education, students still have trouble understanding how all the components of an integrated system fit together." They go on to argue that almost any ERP-based exercise is inherently cross-functional but that in-depth ERP-based case studies are needed to fully realize the cross-functional integration potential of ERP.

The use of ERP as an integrating theme has been proposed at the MBA level (Rivetti, Schneider and Bruton, 1999). In addition, a number of studies have discussed the use of ERP across a varying number of classes and disciplines in the undergraduate business curriculum (Wagner, Najdawi and Otto, 2000; Becerra-Fernandez, Murphy and Simon, 2000; Corbitt and Mensching, 2000; Hawking Shackleton and Ramp, 1999). A recent study by Bradford, Vijayaraman and Chandra (2003) has surveyed schools to identify reasons for adopting or not adopting ERP for classroom use, as well as, examining how ERP is implemented in those schools that have adopted it.

## **2. USE OF ERP/SAP FOR CURRICULUM INTEGRATION**

The College of Business Administration at Northern Arizona University (CBA) adopted SAP as its ERP package and began an experiment in the use of ERP as an integrating theme for a block of core business classes in the fall of 2001. Initially, the CBA's core classes in Finance, Management Information Systems, and Production and Operations Management were integrated into a simultaneous (the full block had to be taken as a block in a single semester) 9 credit hour "block" taught using a team-teaching approach, but with separate grades assigned for each class. This effort did produce measurable increases in the integration of learning across the classes (Lorents, Morgan, and Tallman, 2003). However, when an ad-hoc committee solicited feedback from the Dean's Office and faculty involved in the program a number of concerns were raised which led the CBA to modify its integration approach. Among the concerns raised by the Dean, Associate Deans and faculty were: difficulty in accommodating part-time students and transfer students who might have taken one or more classes in the block elsewhere, student resistance to limitations in schedule flexibility imposed by the simultaneous block, and the inability to grow a set of faculty willing to take on the time investment involved in participating in this form of integration project.

Faculty who taught the integrated block classes were also asked to review and summarize student reactions to the block classes based upon written student evaluation responses. Faculty reported that students generally felt that the use of ERP systems helped them gain a better understanding of business processes across the organization. However, a number of students complained that too much of the ERP related content remained focused on the mechanics of using the SAP system without sufficient illustration of how the processes fit together. An additional complaint, valid or invalid, by many students was that the set of block courses was more time-consuming and difficult than the same courses taken separately.

Based upon this experience, the CBA modified its approach to the use of ERP in the core with two targets in mind: 1. to provide a less coordination intensive form of block integration and 2. to deliver the ERP content in a way that increased the focus on business concepts and integration. Specifically the CBA switched to a form of integration that does not require that students take the courses using ERP simultaneously and requires only minimal coordination of assignments by the instructors in the participating classes. The key to the effectiveness of this approach has been the CBA's use of a single professional staff member to develop an integrating set of tutorials and cases around a simulated company that supplies the data used across all of the participating courses.

While, the CBA is still in the early stages of implementing this approach, we feel that it provides a number of advantages. First it allows the development of a story or set of stories about the company that can be built upon across the curriculum and used to focus students on simulated business problems. Second, the development of customized SAP instances built around the simulated company also allows us to simplify the user interface in order to move the focus of student learning away from mechanical manipulation and toward the understanding of integrated processes. Finally, the presence of a single professional staff member with integrated knowledge of the program allows faculty to undertake the incorporation of SAP in their classes at much lower cost.

In the sections that follow, we first describe the model company that has been developed at the CBA. Next, we describe its use across the two junior level core courses, a management information systems (MIS) course and a course in production and operations management (POM), that are actively using this company and its ERP data. Those sections are followed by a discussion of the issues involved in the configuration and maintenance of the custom clients that are required to support this approach. Finally, we discuss planned extensions and lessons learned in the use of this integration mechanism.

### **2.1 Sand Cruiser Company Model Description**

One of the primary obstacles in using ERP software in the classroom is the difficulty in providing a meaningful set of data for student use. Although SAP provides preconfigured

data with their IDES (Internet Demonstration and Evaluation System) the available data and examples rarely transfer across the various functional modules. Instead, IDES consists of separate data sets and examples designed to support specific SAP delivered training courses which tend to focus on individual modules. Sein, Bostrom, and Olfman (1999) suggest that training in the use of information technology tools needs to move away from a focus on physical use of the technology toward an approach which encompasses knowledge at all levels from the physical manipulation to conceptual and objective knowledge of how the tools can be applied. If this broader view is needed in a business training environment, it is even more critical in a university environment where students lack the experience base required to place technical skills in the context of their business use.

Initially, the CBA used the SAP IDES data, augmenting them with supplemental transaction data entered by the students. While these data can be used to support various classroom examples designed to illustrate specific topics it was often necessary to use independent examples when moving from course to course or even when using different SAP modules within the same course. This fragmentation limited the effectiveness of ERP as an integration tool and was the principle motivation for our development of an ERP based curriculum revolving around a single central example company. One of the clear advantages of using a comprehensive ERP system like SAP in a business school curriculum is that every facet of the business process can be exhibited. With the addition of a central example company, students using the ERP software are able to see how decisions made in an POM class translate into issues to be dealt with in MIS, or marketing classes. With the benefits of the central example company in mind, NAU/CBA began the process of creating the company in the SAP system.

One approach to developing this type of company model is to replicate an actual company familiar to many Arizona students in the SAP system. While this option allows for a solid connection to the business world outside the classroom, it poses a number of difficulties. Finding a company willing to share such data, even in an historic context is difficult. Further, adapting the data to meet the privacy needs of the company while still providing a variety of meaningful scenarios for student analysis, and avoiding excessive complexity is an extremely challenging undertaking. Because of these limitations, the CBA decided to focus on the approach of creating a functional hypothetical example company.

The creation of an example company entails careful planning and research. While this example company is fictional in nature, it still needs to exhibit all common business procedures across the various functional modules. Properly developed, such an example company allows data and cases to be customized to fit individual classes, while having a core business structure basic enough to be described in a five to ten page case rite-up that can be used

across all classes. In May 2003, work began on the example company, named SOS (Sun Ocean Sand) Inc.

SOS Inc is a recreational vehicle manufacturing company. To increase the level of student involvement, SOS Inc creates products, wind-powered beach cruisers, which can be tangibly represented by a popular line of children's building block kits, the LEGO® Beach Cruisers kit. Not only do these products spark student interest due to their recreational nature, but the use of the building block kits gives students a physical reference during the software based lessons and exercises. The actual classroom use of the building blocks is described in greater detail in the following sections.

The SOS Inc example company is built to include local addresses and contact information, giving students a feeling that the company is in fact real. Several students have actually inquired as to whether or not the company exists. During the introduction and subsequent lessons, the company is referred to as a real company, promoting the link to the external business world for students. In fact without actually driving to the addresses listed in the SAP system, students are hard pressed to prove the company is not real, as it has the ability to function as a true business from order to cash. Using SOS Inc, students are able to procure materials, schedule production, produce and sell products, and track the entire process through real time accounting reports. The use of the example company structure has also proved an ideal vehicle for incremental expansion of the ERP related curriculum. For example, recently historic sales data, including distribution channels in five western states for three product lines, have been added to the SOS Inc, data set allowing students to practice enhanced marketing and management analysis techniques. By creating an example company with the goal of complete realism in mind, NAU/CBA has developed a way in which virtually all business classes can refer to a central example to better integrate knowledge across the various business disciplines.

The most extensive use of the SOS Inc example company thus far has occurred in two core courses at the junior level, the MIS course and the POM course. Students taking these courses have had an introduction to information systems, as well as, accounting, economics, and quantitative methods courses. They may or may not have completed other junior level core classes in management, finance, and marketing. The use of the SOS example company in these two core classes is now discussed in greater detail.

## **2.2 Use of SOS in the MIS Course**

Typical components of the junior level MIS course in most business schools include the following:

1. The role of information systems in organizations and how these roles relate to organizational objectives and structures.
2. How information systems support strategic and operational functions.

3. Using information systems for competitive advantage.
4. An overview of major business processes and how they are inter-connected.
5. The information flows and functions of the primary business systems.

These components drive the integration of content from most of the major business process areas in business organizations. Using ERP software that has integration built in helps to demonstrate the interaction based on running various types of business transactions. A number of ERP projects have been implemented in the MIS course using the SOS application to illustrate various business systems and reporting scenarios.

### **2.2.1 Beach Cruiser Production**

Students are given an introduction to SOS Inc and the beach cruiser product. A model is brought into class along with production diagrams so the students can see the physical make up of the beach cruiser. They are given exercises that they work in SAP that pertain to the following activities: 1) Setup of planned requirements (demand) for the cruiser, 2) Set up of some of the components in the material master including Basic Data, Purchasing and MRP views, 3) Setup of one of the subassemblies in the Bill of Materials, 4) Execution of MRP that explodes the requirements into production orders and orders for raw materials, 5) Viewing the stock requirements (Figure 1) to see what is currently in stock, what is planned and what is needed (requirements), 6) Conversion of planned production orders to production orders, 7) Issuing components (goods) to the production line needed for the production order, 8) Accepting the finished product into finished goods stock, and 9) Reviewing the stock requirements again after the production order has been completed.

This set of exercises gives the student an overview of the various business processes that are involved in inventory and production. The student sees how a Bill of Material is used to explode requirements and how those requirements are turned into production orders and purchase orders that take into consideration lead times and scheduling necessary to meet the end product requirement. It also gives the student an overview of a Material Master and the data necessary to support the various uses of that component in other business processes such as in financials, purchasing, stock areas, and production.

### **2.2.2 Beach Cruiser Sales and Distribution**

After the cruisers are built and are transferred to the finished goods stock area, students complete exercises to process a sales order, ship the product, invoice the product and collect payment. More specifically, these exercises include the following activities: 1) They process an inquiry from a customer for 20 cruisers (Figure 2) that checks inventory and prices the order, 2) Given an OK from the customer, they turn the inquiry into a sales order, 3) The student now takes on the role of a shipping clerk, notes the

sales order and delivery date, and creates a shipping document referencing the sales order, 4) Next the student assumes the role of a stock person and enters the amount picked on the delivery document indicating that this amount has been pulled from inventory and is on the truck, 5) The student bills the customer by generating an invoice based on referencing the delivery document in SAP, 6) Finally, the payment received from the customer is processed by recording the amount to the proper bank account and to the proper customer account.

### **2.2.3 Beach Cruiser Reporting**

After the Beach Cruisers have been produced and sold, the students are given exercises that show them how to use SAP to produce management reports with drill down capability to see the detail behind summary information. Students are given exercises to produce reports in SAP, do some analysis of those reports, and make some management decisions based on those reports. Examples include the following: 1) Monthly sales information on cruisers including drilldown, 2) Sales information on cruisers by sales district including drilldown (Figure 3), 3) Sales information on cruisers by distribution channel – Wholesale and Direct, 4) Accounts receivable analysis by customer, 5) Export of sales information into a spreadsheet for further calculation and analysis (Figure 4).

These reporting exercises give students some feel for how reports can be generated as well as how to drill down on summary data and see the detail that makes up a line of data on a report. Students also see the integration of data in the sales area with data in the financial area.

### **2.3 Use of SOS in the POM Course**

Enterprise Resource Planning (ERP) systems naturally integrate with many of the topics in a typical Production Operations Management (POM) course. The integration of SAP's R/3 software into our POM course was initiated in 2001. First efforts included integrating the POM textbook chapters on Aggregate Planning and Material Requirements Planning with portions of the SAP R/3 business process, "Production Planning" (Figure 5). Beginning with some ground-breaking work done at other business schools, we proceeded by developing original examples and structured tutorials for students.

We have developed the capacity to provide our POM students a robust experience with the SAP R/3 "Production Planning" module and integrated several POM topics as well. In addition, our approach utilizes integration with the "Materials Management" and "Sales and Distribution" modules (Figure 6). Our students' experiences are also grounded in the use of internally developed case studies and tutorials that tie directly with the following POM textbook topics:

1. Sales Forecasting
2. Aggregate Planning
3. Material Requirements Planning

|               |            |  |
|---------------|------------|--|
| Material      | BC-S       | Beach Cruiser S                        |
| Plant         | A096       | MRP type PD Material type FERT Unit EA |
| Date          | 03/25/2004 | MRP ... Stock                          |
| Date          | 03/29/2004 | PIOrd. 0000010596/Stck                 |
| Date          | 03/29/2004 | IndReq LSF                             |
| Reschedul...  |            |  |
| Rec./reqd.qty | 20         | 20                                     |
| Available qty | 20         | 0                                      |

Figure 1 Stock Requirements List

|                 |               |   |                |                 |
|-----------------|---------------|---|----------------|-----------------|
| Inquiry         |               | Net value                                     | 20,000.00      | USD             |
| Sold-to party   | 1             | Southwest Recreational Vehicles // Phoenix AZ |                |                 |
| Ship-to party   | 1             | Southwest Recreational Vehicles // Phoenix AZ |                |                 |
| Purch.order no. | 101           | PO date                                       |                |                 |
| Sales           | Item overview | Item detail                                   | Ordering party | Procurement     |
| Valid from      | 04/08/2004    | Valid to                                      | 05/08/2004     |                 |
| Req. deliv.date | 0 04/15/2004  | Expect.ord.val.                               | 6,000.00       | USD             |
| All items       |               |   |                |                 |
| Item            | Material      | Order quantity                                | SU             | Altitm          |
| 10              | BC-S          | 20  | EA             | Beach Cruiser S |

Figure 2 Customer Inquiry

Switch drilldown...

Top N...

Sales district
Arizona

No. of Sold-to party: 5

| Sold-to party      | Incoming orders | Orders quantity | Invoiced Sales    |
|--------------------|-----------------|-----------------|-------------------|
| Total              | 0.00000 USD     | 0 EA            | 518,700.00000 USD |
| Southwest Recreati | 0.00000 USD     | 0 EA            | 140,000.00000 USD |
| Tucson Sports Supp | 0.00000 USD     | 0 EA            | 185,000.00000 USD |
| Outdoor Sports     | 0.00000 USD     | 0 EA            | 33,800.00000 USD  |
| Tempe Outfitters   | 0.00000 USD     | 0 EA            | 55,900.00000 USD  |
| Tucson Racing      | 0.00000 USD     | 0 EA            | 104,000.00000 USD |

Figure 3 Sales Organization Analysis

|                         |                 |     |                |     |                  |     |                          |
|-------------------------|-----------------|-----|----------------|-----|------------------|-----|--------------------------|
| No. of Sold-to party: 8 |                 |     |                |     |                  |     |                          |
|                         |                 |     |                |     |                  |     |                          |
| Sold-to party           | Incoming orders |     | Invoiced Sales |     | Inv. sales: cost |     | % of Invoiced Sales Cost |
| Total                   | 0               | USD | 472,875.00     | USD | 190,000.00       | USD | 40.18%                   |
| Outdoor Sports          | 0               | USD | 33,800.00      | USD | 13,000.00        | USD | 38.46%                   |
| Tempe Outfitters        | 0               | USD | 55,900.00      | USD | 21,500.00        | USD | 38.46%                   |
| Tucson Racing           | 0               | USD | 104,000.00     | USD | 40,000.00        | USD | 38.46%                   |
| Ogden Sports Speci      | 0               | USD | 45,500.00      | USD | 17,500.00        | USD | 38.46%                   |
| Salt Lake City Spo      | 0               | USD | 81,900.00      | USD | 31,500.00        | USD | 38.46%                   |
| Santa Fe Outdoor E      | 0               | USD | 49,400.00      | USD | 19,000.00        | USD | 38.46%                   |
| Albuquerque Marine      | 0               | USD | 39,000.00      | USD | 15,000.00        | USD | 38.46%                   |
| Alamogordo Land Ra      | 0               | USD | 63,375.00      | USD | 32,500.00        | USD | 51.28%                   |

Figure 4 Sample Spreadsheet Download with Percent Added

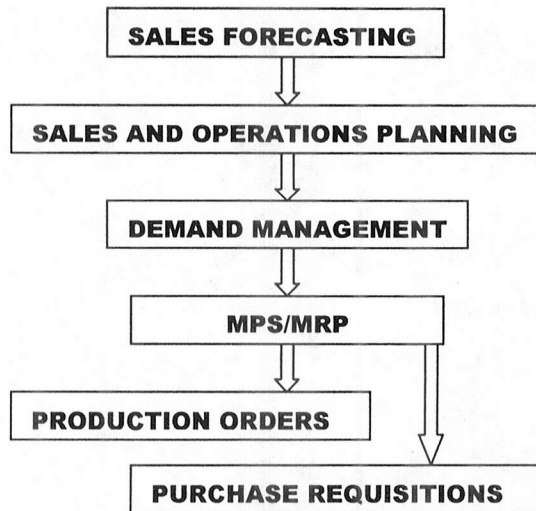


Figure 5 SAP R/3 Approach to Production Planning

4. Order Sizing
  - a. For raw materials using the EOQ model and with quantity discount situations
  - b. For manufactured semi-finished materials using the Production Order Quantity model
5. Materials Management
  - a. Vendor selection
  - b. Purchase requisitions

Our approach is to first develop the POM tool/concept (e.g. "sales forecasting") in the classroom and create the relevant business information (sales forecast, aggregate plan, etc.). This is followed by demonstrating how the information the students have created is input and used in the SAP R/3 system. In some cases, the creation of the business information requires first finding the necessary supporting data in the SAP R/3 system. For example, in order to create a sales forecast to drive the "Production Planning" process, the students must use historical sales data. These sales data are found in and extracted from the "Sales and Distribution" process module of the SAP R/3 system. An activity like this provides the students a realistic opportunity to work within and between the modules of an integrated information systems environment.

Our most recent learning advance is the use of the SOS product to provide the students with a context for the production planning process. To further enhance the context, we have developed participative case studies that include a student "Internship" and a "Plant Tour".

The "Internship" introduces the student to SOS Inc and their primary product, the "Beach Cruiser". This portion of the case study exposes the student to the activities of SOS Inc within the framework of business processes. The "Plant Tour" takes the student on a trip through the two fabrication facilities of SOS Inc – The Nogales Plant and the Flagstaff Plant.

## SAP

|                                     |                                 |
|-------------------------------------|---------------------------------|
| <b>SD</b><br>Sales and Distribution | <b>PM</b><br>Plant Maintenance  |
| <b>MM</b><br>Materials Management   | <b>PS</b><br>Project Systems    |
| <b>PP</b><br>Production Planning    | <b>WF</b><br>Work Flow          |
| <b>QM</b><br>Quality Management     | <b>IS</b><br>Industry Solutions |
| <b>FI</b><br>Financial Accounting   | <b>AM</b><br>Fixed Asset        |
| <b>CO</b><br>Controlling            | <b>HR</b><br>Human Resources    |

Figure 6 SAP R/3 Modules

To provide context regarding SOS Inc.'s product, we use the LEGO® Beach Cruiser. The Beach Cruiser contains a manageable number of parts and is ideal for our purposes. One day of class is devoted to a demonstration of how the product is fabricated in the two SOS Inc. plants. Most of the students are placed in work cells in either the Nogales or Flagstaff Plant. Other students role play as quality inspectors and logistics personnel. At the Nogales Plant, raw materials (LEGO® parts) are taken from inventory and transformed into semi-finished materials and transferred to work-in-process inventory. The semi finished goods are then loaded on a truck (small wagon) and shipped to the Flagstaff Plant warehouse. Processing and final assembly of the "Beach Cruiser" takes place at the Flagstaff plant.

The individual parts of the "Beach Cruiser" are used later in the class as examples to determine order sizes for raw materials and semi-finished goods. Students then input these order sizes into the MRP module. During this portion of the class (approximately six weeks) classroom and SAP R/3 lab activities relate to some aspect of the fabrication of the "Beach Cruiser".

### 2.4 Custom Client Configuration and Maintenance

While the benefits of using SAP as an integration tool are numerous, it does come with some cost. The initial configuration and ongoing maintenance of a customized SAP client require an advanced understanding of the software. In the case of NAU/CBA's custom client, two separate routes have been undertaken.

The SOS client was originally created on a small, locally operated, SAP instance. A single instance of the SOS client was produced. The original SOS template company was configured from scratch, and then copied several times using the SAP Computer Aided Testing Tool (CATT). Many identical SOS companies were created, so that each student was able to interact with their own personal company. Not only did this greatly increase the ability to gauge individual student performance, but it also improved security for individual student data. Sales records used in



MIS and POM classes were created in a single copy of the SOS company code. As several users can access sales reports from a single company code simultaneously, there was no need to create sales records for every individual student company.

After the student SOS companies have been created, semester to semester maintenance becomes necessary. The SOS company is designed to be an ongoing entity. For this reason the student SOS companies require the following maintenance before each new semester: posting periods need to be closed, production materials needed to be restocked, individual company functionality must be checked, and student user accounts are deleted/created.

To lower the cost of the administration and maintenance of its SAP systems, NAU/CBA recently decided to forgo local installation of SAP and instead be hosted by one of SAP's University Competency Centers. Although changing from the NAU/CBA SAP 4.6c installation to the University of Missouri's SAP 4.7 system meant recreating the SOS client from scratch a second time, access to the larger server system has done away with much of the ongoing maintenance.

The new SOS client has been created as a master client. Upon successful creation, the SOS master client is copied, and a production client is created. Students use the production client for one complete semester, at the end of which the used production client is replaced with a new copy of the SOS master client. This new procedure provides a great deal of security for the original SOS client data, and eliminates the need to check and correct data in the used SOS student companies.

### 3. CONCLUSIONS AND FUTURE DIRECTIONS

What prompted us to embark on such a significant change in our delivery of these courses? First, we believe that exposure to and experience with ERP systems is very beneficial to our students as they enter the job market. Second, our students entering the POM and MIS classes arrive with little or no context for the content of these courses. There is little traditional manufacturing in Arizona. Many of our students come from families without members involved in business, let alone a manufacturing business. They have little context for understanding production processes or the flow of information across business processes. POM and MIS textbooks typically lack a unifying theme, such as a case study, to integrate the concepts and tools demonstrated. As a result, most of our students have found their experience in these classes to be foreign to any experience they can relate to and have perceived the topics of these classes to be unrelated to each other. We believe that, the development of our case study approach integrated with the SAP R/3 business process modules is better education for our students and that our present approach puts the course material into a much more "user friendly" context.

The development of our ERP curriculum is an ongoing learning process. The initial use of the team taught block approach taught us valuable lessons and provided insights into the relationships between the courses that were crucial to the development of the common case study approach that we are currently using. The tendency of some students to be overly focused on the mechanics of the software is a limitation that must always be addressed in implementing hands-on assignments. We believe that the use of a hypothetical company with simplified but realistic and fully integrated sets of data and business scenarios has allowed us to focus more on managerial decision making and less on mechanical manipulation of the software system. This appears to be supported by qualitative analysis of student evaluations from classes using these materials.

We believe that the use of the example company also provides a solid base for incremental expansion of managerial scenarios. Expanded use across additional classes will allow us to further extend the use of ERP systems as an integrating theme going forward.

We plan to expand the breadth of our coverage by introducing students to the use of CRM components and perhaps some use of data warehousing as well as to expand the depth of our coverage to financial reporting. We also plan to develop production and sales scenarios that allow side by side comparisons across different phases of execution to allow us to better illustrate how the financial accounts reflect these different phases.

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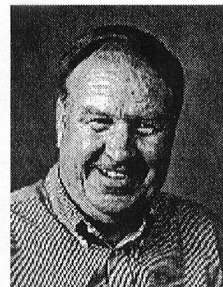
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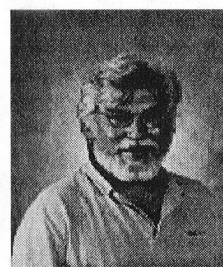
**Todd Johnson**, Instructor in the College of Business Administration at Northern Arizona University. Todd holds an MBA degree from with a specialty in Management Information Systems from NAU. He currently teaches introductory and upper division CIS classes, as well as, SAP labs for various classes.



**Al Lorents**, Professor of CIS in the College of Business at Northern Arizona University. Al holds a Ph. D. in MIS from the University of Minnesota, and has taught at NAU since 1971. Al started his career in information systems with Honeywell, and has had interim assignments with Sandia Labs, Lawrence Livermore Labs, Arizona Public Service, and Micron during his tenure at NAU.

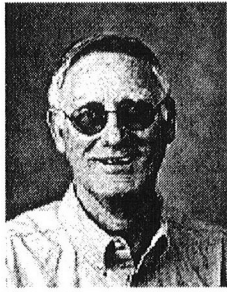


**Jim Morgan**, Professor of Computer Information Systems in the College of Business Administration at Northern Arizona University. Jim holds a doctoral degree in economics from the University of Missouri-Columbia. He has taught in the computer technology field for 20 years. Jim's research has appeared in a variety of journals including: Information and Management, the Journal of Education for Business, and the Journal of Information Systems Education. Jim teaches Database Management, Application Development, and Management Information Systems classes.





**Jon Ozmun**, Professor of Management in the College of



Business Administration at Northern Arizona University. Jon holds a doctoral degree in economics from the University of Oklahoma. He has published numerous business case studies in the Case Research Journal. Jon teaches Business Strategy and Operations Management. He has served as faculty advisor to NAU's International Collegiate

Business Strategy Competition teams which have won multiple awards