CREATING AN ERP EMPHASIS IN THE IS CURRICULUM

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ABSTRACT

In an era in which there has been a dramatic drop in the number of students choosing to major in Information Systems (IS), universities are seeking ways to attract students to their IS programs. This paper describes how one university decided to offer an Enterprise Resource Planning Systems emphasis in the IS program and how exposure to Enterprise Resource Planning (ERP) concepts and components was integrated into the IS curriculum.

Keywords: ERP, SAP, ABAP Programming, ERP Integration, IS Curriculum

BACKGROUND

Around 1997, SAP created the SAP University Alliance (SAPUA) to encourage universities to use and teach with and about SAP. The SAPUA provides fee-based access to SAP R/3 software and free training for university faculty. Georgia Southern University (GSU), a primarily undergraduate institution with student enrollment of 16,500, joined the SAPUA in 1999 and sent selected faculty to SAP training courses shortly thereafter. Although several faculty completed this training, significant use of SAP in business courses, including IS, was slow to roll out.

In 2001-02 the College of Business Administration (COBA) began including one week of ERP instruction in all sections of *Introduction to Business*—a course taken by all business majors. This created interest in ERP and prompted students to request a course dedicated to ERP instruction. As a result, an *Introduction to ERP* course was created and offered for the first time in the fall of 2002-03 and has since become a regularly offered elective in the IS major.

At about this same time, enrollment in IS programs nationwide declined dramatically (due largely to the dot com bust). After examining how the IS program at GSU could be made more attractive to students, it was decided to create several emphasis areas within the IS major.

The choice of emphasis areas was driven by two factors: (1) niches in which faculty held or could quickly obtain expertise; and (2) niches that would attract students to the IS major. Given the SAP training completed by and available to faculty and the salary differential for students who complete SAP courses [2], support for an ERP emphasis quickly emerged.

In the summer of 2005, seven of the ten tenured/tenure-track IS faculty attended SAP training. As a result, two new courses using SAP were created: *ABAP Programming* and *Enterprise System Configuration*. SAP was integrated on a smaller scale into the existing *Decision Support System*s course and one graduate course (*Information Technology Management*). During this time period, COBA also began offering two courses utilizing SAP: *Human Resource Information Systems* and *Planning and Control Systems.*

This complement of courses enabled the creation of an ERP emphasis in the IS degree. Students choosing the ERP emphasis complete four courses beyond the IS core: *Introduction to ERP*; *ABAP Programming*; *Enterprise System Configuration*; and either *Human Resource Information Systems* or *Planning and Control Systems*. The first three serve as IS electives in the student's degree program, the fourth as a general elective. The ERP courses and course components offered by the IS department, along with some of the associated challenges, are detailed below.

In addition to the ERP emphasis, the other six emphasis areas created in the Information Systems major were accounting information systems, business intelligence, electronic commerce, enterprise security, logistics information systems, technology entrepreneurship.

INTRODUCTION TO ERP

At most universities the introductory ERP course includes an overview of ERP concepts and some hands-on access to ERP software. Because SAP is the ERP market leader and offers the SAPUA program, most universities use SAP as the tool for their ERP courses. Much has been written on the use of ERP (and especially SAP) in the university curriculum, as shown in the list of references. Although many universities offer an introductory ERP course, in some instances this consists mainly of hands-on SAP instruction. The *Introduction to ERP* course offered by GSU consists of lectures on ERP concepts and weekly, hands-on use of SAP.

One of the biggest challenges in teaching ERP is finding textbooks. The first book aimed at the university ERP course was the Sandoe, Corbitt, & Boykin [23] text. For several years this was the only textbook aimed at this market. More recently, the Monk and Wagner [21] book has become widely used and is in its second edition. The Sumner [24] book has been available since 2005 and provides an additional choice for an ERP textbook. The most recent ERP book, written by Hayen [12] and published in 2006, provides a practical SAP orientation. Roger Hayen [4, 5, 9, 12, 13, 14, 15 & 16] is widely published in the field of ERP and SAP. Thus, this book is likely to be widely adopted.

ABAP PROGRAMMING

The *ABAP Programming* course was offered for the first time Spring 2006. ABAP, the proprietary programming language for SAP, is an acronym for Advanced Business Applications Programming. ABAP Objects is the current extension of the language and includes both classical/procedural programming approaches and object-oriented techniques.

Students enroll in this course after completing the *Introduction to ERP* course and two semesters of Java programming. It is not an introductory programming course, but a senior-level elective emphasizing the application of previously learned programming concepts to the ABAP language.

The ABAP language has extensive functionality, including the ability to create business application programs, generate reports, access and manipulate database tables, and create dialog-controlled transactions. While not as popular as Java, C, or VB .Net, ABAP is a powerful business programming language and is ideally suited for IS students and vital to the ERP emphasis.

 The goal of the course is to familiarize students with the ABAP Objects programming language as used in the SAP enterprise system. The primary objectives of the course include the following:

1. Introducing students to the ABAP Objects programming language
2. Writing ABAP applications using the ABAP workbench and data dictionary
3. Differentiating between the types of programs and developing expertise in coding list programs
4. Effectively utilizing sophisticated selection screens, internal tables, subroutines, and other advanced features in ABAP list programming

Students are assessed using lab exercises, programming projects, and exams. The course content includes the following:

- Introduction to the ABAP Workbench and the SAP enterprise system
- Formatting and manipulating data
- Structures and tables
- Internal tables and Open SQL
- External file manipulation
- Input selection screens and output list reports
- Modular programming using subroutines, function modules, and events
- ABAP data dictionary

The ABAP workbench is the primary software tool used to develop, test, and launch ABAP applications. It contains various tools for processing what are known as repository objects. These tools cover the entire software development cycle and include the following:

- ABAP editor – for editing source code
- ABAP dictionary – for editing database table definitions, data types, etc.
- Screen painter – for configuring screens
- Menu painter – for designing user interfaces
- Function Builder – for processing function modules
- Class Builder – for processing global classes

There are several challenges in offering this course. First, ABAP is complex in functionality and approach. It is recommended that the instructor acquire external training to prepare for teaching the course. This can be accomplished through the SAP University Alliance summer training programs for

university professors or through professional SAP Education training courses.

A second challenge is ensuring quality technical support. Most universities (including GSU) do not have an on-site SAP server and instead access SAP through a hosting arrangement with one of several SAP-designated University Competency Centers. As such, instructors do not have direct management of or access to the SAP server network. If problems arise, instructors must rely on the support and guidance of an off-site technical support person. Problem resolution can be time-consuming and significantly stall the progression of the class.

A third challenge is finding suitable teaching materials and a textbook. There are a handful of ABAP books, but most are written by professional ABAP consultants, not academic professors. This is problematic because these books generally have a reference approach instead of teaching concepts. They also lack end-of-chapter review activities, programming assignments, presentation materials, and other traditional teaching ancillaries. The book selected for this course is *ABAP Objects*, written by SAP consultants Horst Keller and Sascha Kruger [18] in 2002.

Enterprise System Configuration

Students taking this course must first complete the *Introduction to ERP* course. As a result, they are familiar with basic SAP modules and the supply chain processes of a business. The course focuses on configuring and testing a SAP system for use in a large organization. Students learn how to setup a company from the ground up using SAP R/3. Throughout the semester, students create and test the organizational structure, master data, and business rules to integrate different functional business processes such as purchasing, sales, distribution, logistics, accounts payable, accounts receivable, etc.

The ERP configuration course consists of three parts: lectures, labs, and a group project. The lectures use a systems analysis and design viewpoint to explain SAP. An entity-relationship data model is used to explain the organization and structure of SAP (e.g., Client, Company, Chart of Accounts, Company Code, Fiscal Year Variant, and Credit Control Area, and SAP modules). Data flow models are used to explain the roles and business activities of the Financial Accounting (FI), Materials Management (MM), and Sales and Distribution (SD) modules. The lectures cover the concepts of business functions, processes, database, and the integration of different concepts in an enterprise system. The lectures also explain the modules/components required in ERP system configuration and testing, and why those modules/components are needed.

Students apply the concepts learned in lectures to SAP labs, where they learn the steps required to configure and test an ERP system for a company. A key feature of the labs is a semester-long project involving the creation (from the ground up) of a fictitious trading company. Students work in cross-functional teams of three or four to complete the project. Each team member assumes a role in a different functional area (e.g., Purchasing, Sales, Logistics, and Accounting). Every group configures and tests an enterprise system using SAP for its company. Students experience first-hand the difficulty and complexity of configuring and implementing an enterprise system, deal with group dynamics, and learn a valuable lesson in enterprise systems configuration and testing.

Data Warehousing and Business Intelligence in Decision Support Systems

A data warehouse is a centralized collection of data and metadata from multiple sources, integrated into a common repository and extended by summary information (such as aggregate views). Decision makers use tool such as report generators, OLAP (on-line analytical processing), and data mining software to interrogate the data. Interrogation may lead to the discovery of valuable business-related insights or a deeper understanding of trends and problems that impact important decisions.

Data warehousing crosses over the areas of data management and decision support systems (DSS). This breadth leads to the complication that if a course covers only the client tools that decision makers may use, or covers only the underlying data management issues and architecture of the data warehouse, then students may not fully understand the potential or problems associated with this technology. One approach to teaching data warehousing exposes students to the client tools and the architecture of the data warehousing environment. Because this strategy involves complex analytical and technical aspects, teaching this challenging material presents difficulties.

GSU's approach includes data warehousing within the topic of Business Intelligence, which forms a significant part of the *Decision Support Systems* (DSS) course. Because it is important to teach both the practical and theoretical aspects of data warehousing, students need hands-on experience with

a data warehouse product. SAP's Business Information Warehouse (BW) is a comprehensive business intelligence product centered around a data warehouse optimized for the SAP environment. BW was chosen as the data warehousing platform for the DSS course.

Students in the DSS course complete a data warehousing learning module that includes a cohesive collection of material containing both theory and practical exercises. The learning module defines learning outcomes, and prefaces practical exercises with theoretical explanations of business warehouse concepts. The student learning outcomes are as follows:

- Demonstrate an understanding of the major architectural and process components of BW (and data warehousing, in general).
- Articulate elements and demonstrate knowledge and understanding of the SAP BW Information Model.
- Construct and execute a basic ETL process within SAP BW.
- Demonstrate an understanding of the features and value of advanced data analytic (business intelligence) end-user tools, such as OLAP (InfoCubes).
- Demonstrate an understanding of the interconnections and differences between OLTP and BW systems.
- Appreciate that data warehousing and business intelligence initiatives are becoming an increasingly important source of competitive advantage for organizations by helping them to make better, smarter, faster and more evidence-based managerial and operational decisions.

SAP and Data Warehousing in Information Technology Management

The graduate-level *Information Technology Management* course helps students understand information technology (IT) and how to effectively utilize and manage IT in business environments. Some of the course objectives are to…

- Develop a fundamental understanding of key concepts, terminology, and characteristics of information technology applications in today's businesses.
- Develop an enhanced appreciation of the strategic application of IT/IS in business environments and how IT/IS is being used to achieve and sustain competitive advantage.
- Provide an overview and appreciation of key

IT/IS trends and management challenges.
- Provide an overview of the major issues associated with developing and maintaining appropriate information architectures and IT/IS infrastructures within today's organizations in a worldwide environment.
- Enhance communication, analysis, problem solving, critical thinking and decision making skills, specifically related to the evaluation of a company's use of IT/IS for operational, tactical, and strategic competitive advantage to help the student gain an understanding and appreciation of the impact of the Internet, E-commerce, and E-business on global organizations and business environments.
- Understand the moral and ethical issues related to managing and implementing IT/IS.

An additional objective is to expose students to integrated enterprise-wide information systems. The Strategic Enterprise Management / Business Warehouse (SEM/ BW) module of SAP is used to gain a better understanding of how companies translate their firm's vision and strategy into a coherent and linked set of performance measures. Students get hands-on experience using the Balanced ScoreCard component of SEM/BW.

Working in teams of three or four, students also investigate the use of ERP in a specific industry and perform a detailed analysis of at least three major firms within that industry who are using ERP. The investigation focuses on actual and perceived benefits from the use of ERP and the impact of ERP on overall firm performance. Students summarize issues and problems the firm had to overcome in implementing ERP software and complete a financial analysis of the industry and the firms selected.

CONCLUSION

An ERP emphasis is one avenue for attracting students to an IS major in a time of generally declining enrollments. Studies such as the one by Andera [2] demonstrate that students who complete ERP courses command higher salaries in the marketplace and provide a strong incentive for students to enroll in ERP courses.

Although ERP programs at universities such as Central Michigan and Cal State - Chico have been widely publicized, many universities still do not offer any ERP courses. This paper shows how one university implemented an ERP emphasis within an IS program. Other universities considering options to enhance their IS program could also implement an

emphasis in ERP as a way of attracting additional students into the IS major.

REFERENCES

1. Abdinnour-Helm, S. & Chapman, B. (2006). A Usability Study of SAP R/3 in a Course on Enterprise Resource Planning. *Proceedings SAP Curriculum Congress '06,* 25.
2. Andera, F. (2004). Salary Comparison of Central Michigan's College of business Administration Graduates who have and have not taken SAP R/3 Supported Classes. *Issues in Information Systems*, 1, 8-14.
3. Andera, F. & Derringer, D. W. (1998). SAP: Implications for Computer Information Systems. *Journal of Computer Information Systems*, 19(1), 72-75.
4. Andera, F. & Hayen, R. (2006). Moving a College of Business Core Curriculum to the Next Level in SAP Enterprise Software Curriculum Integration. *Proceedings SAP Curriculum Congress '06,* 14**.**
5. Andera, F. & Hayen, R. (2006). Directions in SAP Enterprise Software Integration in Business Curricula. *Proceedings SAP Curriculum Congress '06*, 23.
6. Antonucci, Y. L. Corbitt, G. Stewart, G. & Harris, A. L. (2004). Enterprise Systems Education: Where Are We Going? *Journal of Information Systems Education,* 15(3), 227-234.
7. Boyle, T. (2006). An Enterprise Resource Planning Major for Computing and Information Systems Students. *Proceedings SAP Curriculum Congress '06,* 22.
8. Corbitt, G. & Mensaching, J. (2000). Integrating SAP R/3 into a College of Business Curriculum: Lessons Learned. *Information Technology and Management*, *I*(4), 247-258.
9. Ester M., Kohlhammer, J & Kriegel, H (2000). The DC-tree: A Fully Dynamic Index Structure for Data Warehouses. *Proceedings of the 16th International Conference on Data Engineering*, 379-388.
10. Gust, D. D. & Hayen, R. L. (1999). Including SAP Enterprise Software in the Introductory Business Computer Course. *ISECON Proceedings*, October 1999.
11. Hawking, P., Ramp, A. & Shackleton, P. (2001). IS '97 Model Curriculum and ERP Systems. *Business Process Management Journal*, *7*(3), 225-233.
12. Hawking, P., McCarty, B. & Stein, A. (2004). Second Wave ERP Education. *Journal of Information Systems Education*, *15*(3), 327-332.
13. Hayen, R. (2006). *SAP R/3 Enterprise Software,* McGraw-Hill.
14. Hayen, R. L. & Andera F. J. (2003). Assessment of Student Satisfaction with SAP R/3 Component Courses. *Issues in Information Systems*, *4*(1), 150-156.
15. Hayen, R. L. & Cappel, J. J. (2003). Enterprise Software Certification Academy: A Longitudinal Study. *Journal of Computer Information Systems*, *43*(3), 75-80.
16. Hayen, R. L., Chappel, J. J. & Holmes, M. C. (1999-2000). A Framework of SAP R/3 Enterprise Software Instruction. *Journal of Computer Information Systems*, *40*(2), 79-85.
17. Hayen, R. L., Holmes, M. C. & Chappel, J. J. (2000). An SAP R/3 Virtual Classroom for Asynchronous Collaborative and Experiential Learning. *Issues in Info Systems*, *1*, 189-195.
18. Keller, H., & Kruger, S. (2002). *ABAP Objects: An Introduction to Programming SAP Applications*, Addison Wesley: London.
19. Khan, A. (2002). *Implementing SAP with an ASAP Methodology Focus*, iUniverse Incorp.
20. Klaus, J., Rosemann, M. & Gable, G.G. (2000). What is ERP? *Information Systems Frontiers*, *2*(2), 141-162.
21. MacKinnon, R (2004). Integration of ERP in the Business Curriculum. *Issues in Information Systems*, 413-419.
22. McCarthy, B. & Hawking (2002). Teaching SAP's ABAP Programming Language to IS Students: Adopting and Adapting Web-based Technologies. *Informing Science*, June.
23. Monk, E., Wagner, B (2006). *Concepts in Enterprise Resource Planning*, Thompson.
24. Sandoe, K, Corbitt, G & Boykin, R. (2001). *Enterprise Integration*, John Wiley.
25. Simon, H. A. (1981). *The Sciences of the Artificial,* Cambridge, MA: The MIT Press.
26. Sumner, M. (2005). *Enterprise Resource Planning,* Prentice Hall Pearson.