SAP ERP Case Study at University of Maribor, Slovenia and at University of Economics, Prague, Czech Republic

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The paper describes two cases of Enterprise Resource Planning (ERP) systems integration into the educational process. Case studies used at the University of Maribor, Faculty of Organizational Sciences, Slovenia and at the University of Economics Prague, Czech Republic are presented and explained with regards to where and how they are used. The lectures and seminars on the ERP systems and the market share leader ERP system SAP are available for students at both universities. Both universities have gained much practical experience with the teaching of ERP based on exercises and practical experience with the SAP product done by students. As a next step, both universities plan to prepare a common international e-business course based on scenarios running on the SAP application accessible for students from both universities. This kind of cooperation could give student projects a new international dimension.

Key words: case, education, Enterprise Resource Planning (ERP), process, procurement, SAP, teaching, selling

V pedagoškem procesu uporabljena primera celovite programske rešitve SAP na Univerzi v Mariboru, Fakulteti za organizacijske vede in na Ekonomski univerzi v Pragi

Članek opisuje dva primera uporabe celovite programske rešitve (ERP) znotraj pedagoškega procesa. Opisana sta učna primera uporabe na Univerzi v Mariboru, Fakulteti za organizacijske vede in na Ekonomski univerzi v Prag, Češka. Na obeh univerzah je v okviru predavanj in vaj predstavljena na trgu ena od vodilnih celovitih programskih rešitev SAP. Študentje obeh univerz so tekom svojega izobraževanja pridobili veliko praktičnih izkušenj na tem področju. Obe univerzi se zavedata pomembnosti e-regijskega sodelovanja in v prihodnosti načrtujeta skupno izobraževanje na področju celovitih programskih rešitev vključno s praktično izvedbo vaj iz SAP-a, ki bodo temeljile na skupno zastavljenem scenariju. Tak način e-regijskega sodelovanja bo študentom v okviru njihovega študija prinesel popolnoma nove dimenzije mednarodnega povezovanja.

Ključne besede: študija primera, izobraževanje, učenje, celovita programska rešitev, ERP, proces, oskrbovanje, prodajanje

1 Introduction

According to Wallace & Kremzar, Enterprise Resource Planning systems (ERP) can be described as:

- An enterprise-wide set of management tools that balance demand and supply,
- Containing the ability to link customers and suppliers into a complete supply chain,
- Employing proven business processes for decision-making, and
- Providing high degrees of cross-functional integration among sales, marketing, manufacturing, operations, logistics, purchasing, finance, new product development, and human resources, thereby
- Enabling people to run their business with high level of customer service and productivity, and simultaneously lowering costs and inventories and providing the foundation for effective e-commerce (Wallace & Kremzar 2001: 5).

Currently, enterprises are not willing to wait the typical one to three years time needed for past implementations of large software systems. To meet rapidly changing business needs, enterprises have to find ways to implement most or parts of ERP systems in a matter of months, not years. Knowledge sharing is a critical activity for rapid

implementation (Shields 2001). We can achieve such knowledge sharing in different ways. This assistance can come from someone within the enterprise who has prior experience implementing such systems or it can come from an adviser from the package vendor (Shields 2001) or from students who acquire knowledge during their studies. ERP themes have become important components of higher-education curricula.

In the following paper, two cases of Enterprise Resource Planning (ERP) systems integration into the educational process are described. Case studies used at the University of Maribor, Faculty of Organizational Sciences, Slovenia and at the University of Economics Prague, Czech Republic, are presented and explained. Lectures and seminars on ERP systems and the market leading ERP system, SAP (Boyson *et al* 2004: 151-155), are offered for students at both Universities.

Today, in business to business e-commerce, procurement and selling processes are of strategic importance to enterprises' business processes and present a central part of changes. Different studies predict that between 30 to 40 % of all enterprises will sell goods via the internet and 80 to 90 % will procure goods in this way. Global markets demand quick responses to customers' demands. E-commerce in procurement and selling processes reduces costs, saves time and simplifies processes (Podlogar & Pucihar 2003: 352-366). These reasons lead us to choose procurement and selling process for our teaching ERP systems cases.

Because of ERP system complexity, knowledge transmission as a part of the educational process is a critical activity. The knowledge transfer has to be done firstly in the field of process re-engineering as basis of e-commerce and as a field that enterprises are faced with all the time. Secondly, it has to be done in the field of ERP systems adoption. Students will understand ERP systems operations only with knowledge of both of the above fields.

An enterprise can be competitive only with very well organized internal and external processes with all business partners. It is important to have on one side customers who are able to create orders on-line and on the other side suppliers who are able to deliver goods in cooperation with external logistics partners who are able to deliver the ordered goods in time to the right place (Lesničar 2002, Poirer and Bauer 2001). All these facts are foundational to our teaching ERP cases.

2   ERP systems at Universities

wIntegrating ERP systems in the curriculum of not only universities but all types of institutions of higher learning has been a major challenge for over nearly ten years. The tremendous complexity of ERP systems posed a significant challenge for many institutions. It took until 1997 until a wider integration of ERP systems in the curricula of business, information technology/information systems and engineering schools could be globally observed (Roseman 2004).

ERP systems education is an area requiring special attention for a number of reasons. Students have a strong interest in this subject hoping to gain market-driven skills. While this often ensures high attendance, student perceptions and expectations must be managed carefully in that it is not the objective of such initiatives strictly to enhance student skills via training activities. Managing ERP systems is typically comprehensive and complex. The frequency of upgrades and innovations from one software release to the next characterizes the rapidly evolving nature of these Information Systems (IS) solutions. It is often difficult for the lecturer to stay abreast of these changes and to understand the implications of these changes to business practices, not to mention to research and education in general. By the time current textbooks of satisfying quality are available, there are new system upgrades and innovation cycles to address (Roseman 2004).

Most of the market-leading enterprise systems vendors established University Alliances with regional relationship managers. These alliance programs have enabled curriculum innovations at the undergraduate and postgraduate levels often under a certain subject, such as Information Systems (IS). A number of academics contributed to the area of ERP systems education with case studies (Roseman 2004).

The willingness to gain insight into the rich system functionality requires, first of all, hands-on experiences and material appropriate for tertiary education is still a bottleneck. However, the successful uptake of reliable application hosting solutions seems to relieve at least the burden related to the technical system support. The data also indicate that increased collaboration and global knowledge exchange will be the next wave, which could be observed in this market (Roseman 2004).

The study (Roseman 2004) shows that the students regard gaining practical experience, good learning approaches, helpful class materials, promising job prospects, and good instructors as key success factors for learning SAP solutions.

From our point of view, ERP systems affords a unique opportunity to learn concepts through process analysis. In an ideal situation, when ERP is implemented and integrated across courses, students are better able to visualize the business process view of enterprise, identify and eliminate non-value-added activities, and enrich value-added processes (Bradford *et al.* 2003: 437-456).

One benefit of incorporating ERP systems into curricula through process analysis is to expose students to important concepts of ERP systems and their business process focus. ERP systems enable today's enterprises to transform themselves from a functional orientation towards a business process orientation. Therefore, one of the main reasons for introducing ERP systems into curricula is to expose students to the ways business processes extend across the enterprise and the enterprise's information value chain. Students need to gain a broader understanding of the strategic goals of an enterprise and the business processes that support these goals. Students

should be aware of the problems enterprises experience as they undertake a major ERP system implementation and how, as a business or systems professional, they can help minimize threats to successful projects. As students interact with the vendor-provided database (IDES in SAP is such system) that serves as a hypothetical company, they can see first-hand how complex and truly integrated these systems are (Bradford *et al.* 2003, 437-456).

By incorporating ERP into higher education, students can identify better with the real world as they transfer learned concepts and principles from the classroom into real-life business practices and complexities. Only if universities are aware of the many challenges and undertake a thoughtful and directed approach to ERP dissemination within their schools can the benefits begin to accrue. Overall, there seems to be an eagerness on the part of academia to embrace this technology (Bradford *et al.* 2003, 437-456).

In some cases, the integration of ERP systems into the curricula triggered innovative international collaborations (Roseman 2004). We would like to present two ERP case studies used at the Faculty of Organizational Sciences, University of Maribor, Slovenia and at the University of Economics, Prague, Czech Republic. In the context of SAP-based supply chain, a short explanation of an idea of our next steps for preparing common international scenarios on ERP fields, is also briefly described.

3 SAP ERP Case study at Faculty of Organizational Sciences, University of Maribor, Slovenia

Since 2001, the Faculty of Organizational Sciences University of Maribor, together with two enterprises ,SAP Slovenia and IDS Scheer Slovenia, has been implementing SAP into its teaching process. SAP is included mostly inside the following subjects: Information Systems, Organizational Process Design, eCommerce and the Information System Project. SAP is also presented to students from the non-IT fields of study within these subjects: Production Information System and Human Resource Information System.

As a learning institution, our mission is to identify the necessary business environment knowledge, to create it and to transfer it to our customers – students and enterprises (Gricar *et al.* 2005, 103-108). In this teaching model, we see the possibility of creating awareness about enterprise resource planning systems (ERP) and their integration inside the whole supply chain in the context of above mission.

At the University of Maribor, Faculty of Organizational Sciences, ERP teaching is done by use of different ERP systems for hands-on experience and through students' prototype development projects for use in interested enterprises. Students present results from seminar papers and prototypes to these enterprises. This new information creates opportunities for enterprises to achieve competitive advantages by using ERP systems and their integration through the supply chain.

The ERP case study at the Faculty of Organizational Sciences, University of Maribor is based on two models:

- ERP case studies based on the processes inside one enterprise,
- Two different ERP systems integrations based on the processes between two or more enterprises that are in business partnership.

In both models, students firstly form project teams consisting of three students. Then they go to an enterprise and investigate a problem inside the process, which is proposed by their subscriber from an enterprise.

Usually the problem and process that students analyze in both models, is from either the procurement or selling side. The main reason for mostly choosing these two processes is that business-to-business e-commerce, including e-procurement and e-selling, promises great benefits in terms of cost and time savings, as well as business opportunities in these processes. These two processes are two of the most important processes for each enterprise business (Podlogar 2002).

In our ERP case study, students analyze the real life process, problems inside the process and then try to find suggestions/solutions and means of successfully implementing an ERP system into the chosen process in practical environment,. Students develop different prototypes as a result of the seminar. Parallel to work at the enterprise and prototype developing, students also have lectures, where they gain theoretical knowledge and understanding of IS development methods, IS elements and the use of information technology for better organizational effectiveness.

3.1 ERP case study based on the processes inside one enterprise

The ERP case study is based on the internal processes of one enterprise and consists of two scenarios. The first one is related to procurement process and second to the selling process. Both cases/scenarios consist of different steps. Students go through them and gain practical experience about SAP ERP (IDES) system usage, based on the two cases. In some cases, if the enterprises are small and/or middle sized, students can also chose MS Navision, a widely used ERP system among SMEs in Slovenia.

Following, both scenarios are demonstrated on the figure 1 and 2 and their steps are listed.

Steps of procurement process scenario:

■ Material Master Data
  □ Review Material Master Data
  □ Create Material Master Data
■ Supplier Master Data
  □ Create Supplier Master Data
  □ Change Supplier Master Data
■ Create Info Record (supplier & material)
  □ Create Conditions
  □ Goods Purchase in Stock
  □ Create Purchase Requisition
■ Supplier Selecting
■ Ordering
  □ Create Purchase Order
  □ Display Purchase Order
  □ Purchase Order Print Preview
  □ Save Purchase Order
■ Goods Receipt
  □ Goods Receipt Purchase Order
  □ Suppliers' opened purchase orders list
  □ Delivery Order Posting
■ Stock Overview
  □ Review Temporary Quantity Stock
  □ Review Stock-requirements List
  □ Review Stock Value
■ Goods Purchase in Cost Center
  □ Create into Order
■ Payment to Vendor

Figure 1: Procurement process scenario

Steps of selling process scenario:

■ Customer Master Data
■ Create Info Record (customer & material)
■ Stock Overview
■ Create Inquiry
■ Create Quotation
■ Create Sale Order
■ Outbound Delivery with Reference to Sales Order
■ Create Transfer Order
■ Goods Posting
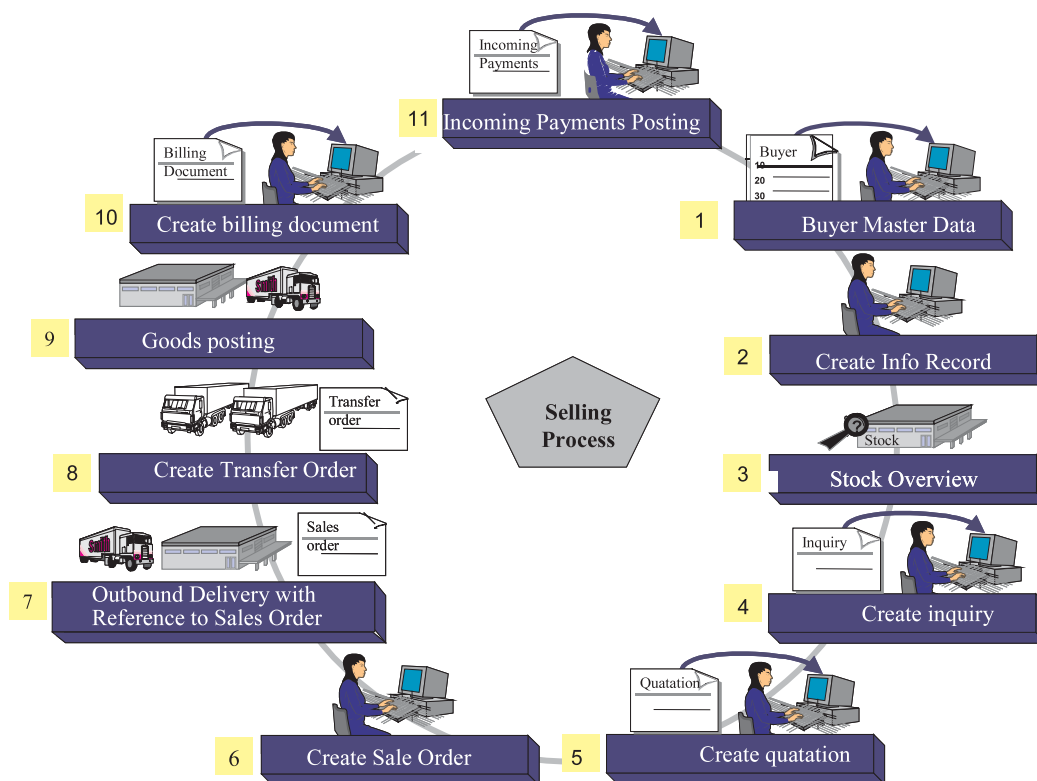■ Create Billing Document
■ Incoming Payments Posting

Figure 2: Selling process scenario

Both of the above cases give students basic knowledge about implementing one of selected processes from the business environment, inside an ERP system such is SAP.

3.2 Two different ERP systems integration based on the processes between two or more enterprises in partnership.

The case study of ERP and e-procurement integration is further discussed in "Connecting Two Different ERP-s: Microsoft Business Solutions—Navision and SAP" (Valjavec 2003, Valjavec *et al.*, 2003). This case is a good example of how to integrate two different ERP systems and achieve e-procurement integration between customer and supplier (Figure 3).

The case explains how enterprises proceed. The students work with two enterprises: one is a supplier and the other is a customer. In this step, students gain knowledge about e-procurement problems between two or more enterprises. Problem and process analyzes are connected to the latest information technology such as ERP.

Following is the short description of this case. E-Procurement requires enterprises to communicate, despite using different ERP systems. A prototype was developed by a student, for his thesis, for two Slovenian enterprises (Valjavec 2003, Valjavec *et al.*, 2003). One enterprise represented the customer's perspective and used SAP ERP for internal business. The other enterprise represented supplier's perspective and used Microsoft Business Solutions – Navision ERP for internal business. E-Transactions between businesses require the sender and receiver to understand the message in the same way. XML-based procurement documents in one enterprise must be acceptable for another enterprise. The greatest problem is that the enterprises use different ERP software, which can't communicate with each other unless there some sort of common connection is established. In the prototype , the customer and supplier exchanged purchase orders, purchase invoices, purchase receipts, sales orders, sales invoices and shipment notifications in electronic form. The interaction between two different ERP systems was established by using BizTalk Server, which enables e-procurement document exchange based on an XML format that is understandable to different ERP systems.

In this project, students learned about ERP and e-procurement integration, which can not be made without business process analysis. This is one reason we are trying to establish a strong connection between students and enterprises.

4 SAP ERP Case study at University of Economics, Prague, Czech Republic

The lectures and seminars on ERP application software and SAP products are mainly offered for two categories of students at the University of Economics in Prague. In the first group there are the students from the Faculty of Informatics and Statistics, i.e. the students of IT-fields of study. The second group consists of students from non-IT fields of study. The SAP application is therefore used in education processes at the different levels:

■ on-line presentation of the main functionalities to students during lectures done by teachers

■ practical exercises with the SAP application based on the predefined scenarios done by students

■ practical exercises with SAP parameters and customization of the application done by students.

The first two levels are applicable for the education of non-IT students as well as for undergraduate students.
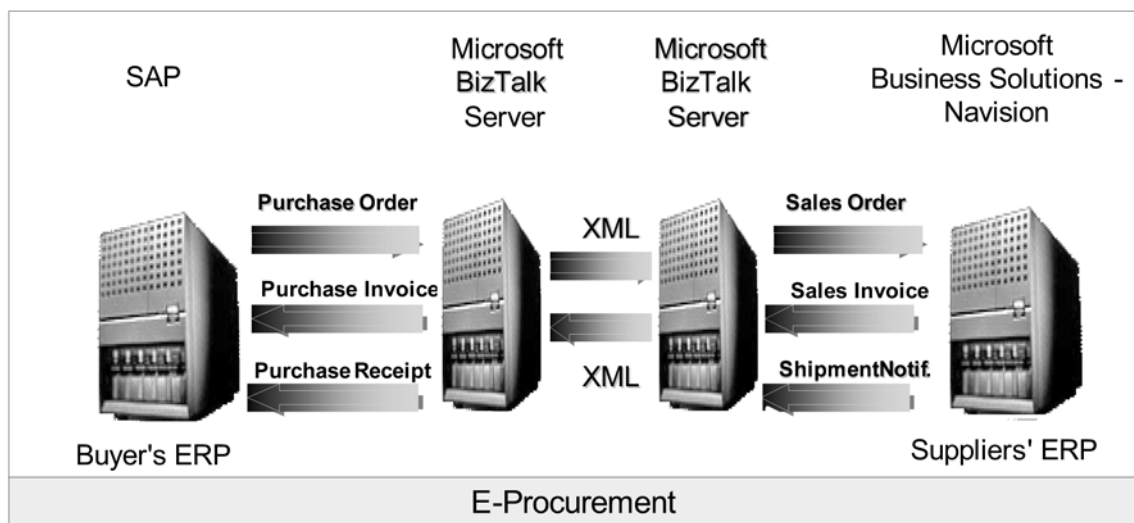

Figure 3: Case of Connecting Two Different ERP systems: Microsoft Business Solutions—Navision and SAP
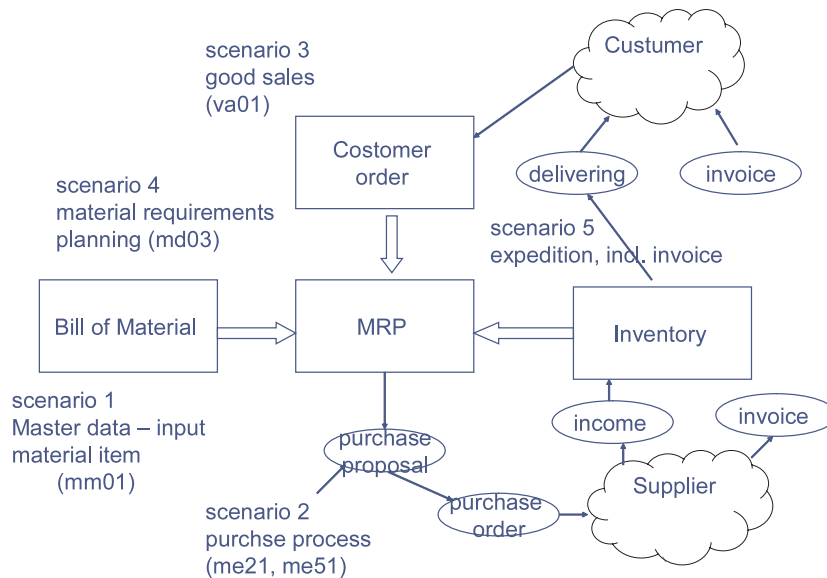
Figure 4: The structure of five logistics scenarios in SAP R/3

The second and most of the third level are the basis for IT students and post-graduate students.

Students have to complete the tasks of the six scenarios during the semester. There are in fact five scenarios plus one as introduction. They complete these tasks in each scenario by following instructions from the prepared documents.

Students work step by step on the tasks described in scenario using the ERP application. Each scenario (Figure 4) is dedicated to one important business process:

■ Scenario 1: master data process - input and maintenance of master data
■ Scenario 2: purchase process – manual input of purchase proposal, purchase order, material income and invoice
■ Scenario 3: sales process – sales order with control of goods availability
■ Scenario 4: planning process – MRP procedure run with discussion
■ Scenario 5: delivering process – distribution of goods plus invoice.
  These business processes are then used as a platform for process optimization and the starting point for e-business.

Each scenario ends with the control point. It is mainly the result from the MD04 transaction (control of availability of material). Besides these five logistics scenarios ,the students have the opportunity to try similar functionality within finance and human resource modules.

The currently used version of the SAP product family on both Universities is SAP R/3 version 4.6c. This platform enables the showing of main features from the enterprise logistics, finance and human resource areas. The current, important feature is, of course, the on-line database integrating both main enterprise pillars; this

means the customer order life cycle with appropriate documents (such as customer order, purchase order, production order, material income etc.) as well as invoices.

In addition to the above-mentioned ERP courses (where SAP application is used), there is one special SAP course offered at the University of Economics in Prague: "Business process supported by SAP products". This course runs every week during semester as 2+2 course (it means 2 hours of lecture and 2 hours of practical exercise in computer lab). The lectures are held by specialist from SAP the Czech Republic and specialists from two SAP implementation firms.

5   Conclusions

Both universities have recently gained much practical experience with the teaching of the ERP topic based on exercises and practical experience with the SAP product done by students. Therefore, it seems very useful and effective to expand the cooperation to similar subjects at both universities. This means:

■ changing the texts for students to exercises
■ changing the experience of teaching ERP to students (especially with regards to practical projects in cooperation with practice and firms).

As a next step, we plan to prepare an international e-business course based on scenarios running on the SAP application accessible for students from both universities. It could give the students' projects a new international dimension. Our future plans are to make an innovative international collaboration on the field of ERP systems education. We already have an international network, "eBusiness ALADIN" – ALpe ADria Initiative (www.aladin.units.it) at the regional level that shares

common ideas and knowledge in teaching and research activities in the field of e-commerce. The intention of the cooperation is to create mobility of students and professors, setting common lectures, creating virtual teams of students from different universities and professors lecturing at different universities, in order to harmonize global and international activities of e-commerce.

We currently have permission from SAP Slovenia to allow other students from the eBusiness ALADIN university group to use the SAP system we have installed at University of Maribor, Faculty of Organizational Sciences; limited to educational purposes. For the future, we are optimistic and we can expect that lecturers and students will more frequently exchange ideas about ERP systems operating. Through joint teaching at different universities, the teaching of ERP systems will become more effective and more understandable to students and to lecturers.

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