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# Leveraging Enterprise-Wide Information System's Curriculum to Teach E-Business Concepts

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## Abstract

Many universities have struggled to incorporate Enterprise Resource Planning (ERP) systems into their Information Systems (IS) curriculum. They are now faced with the issue of how best to incorporate e-business. They often treat the two technologies separately without realising the synergy between the two. We propose that IS curriculum can be extended using an ERP system to teach e-business concepts.

Many IS departments have spent much time and resources in modifying their curriculum to incorporate Enterprise Resource Planning Systems. These systems are seen as a tool to reinforce many IS concepts. To facilitate the inclusion of ERP systems into the curricula universities have formed strategic alliances with major ERP vendors. The ERP vendor benefits from these alliances by increasing the supply of skilled graduates that can support their product thereby enhancing its marketability and lowering the cost of implementation, while the university gains access to the software at a greatly reduced cost. Through these alliances universities have made a commitment to incorporate ERP systems into their curriculum and have expended an enormous amount of effort and resources to achieve this. For many of these universities it is important to investigate how they can leverage their current level of expertise in ERP systems curriculum to incorporate many of the ERP's e-business functionality to support the teaching of e-business concepts. Many consider ERP systems as an essential component of any e-business strategy.

Before a university decides to build upon their existing ERP knowledge and resources to teach e-business concepts and skills in the IS curriculum, consideration should be given to a number of factors, including how e-business is covered in the IS curriculum at present; in what ways and to what extent should e-business issues be addressed; and what ERP resources should be extended to support the teaching of e-business concepts and skills.

This paper examines the potential use of ERP systems as a tool to teach e-business concepts. It discusses the different functionality available and its applicability to IS curriculum.

## 1. Introduction

Over a period of 40 years, the Information Systems (IS) discipline has become an essential component in the employment of information technology personnel in business and government organisations in Australia. IS curriculum has undergone rapid and continuous change in recent times. Since its inception as a discipline in tertiary institutions, IS curricula has undergone continual change. The function of IS now, is one of supporting innovation, planning and coordinating resources and systems, rather than one where specialists work in isolation. It has moved from processing data to providing an information infrastructure with applications aligned to organisational strategy [10]. Although it would not be possible to obtain universal agreement on the exact components, Information Systems is oriented towards business, involving the matching of information systems' requirements to an organisation's objectives. IS professionals, to be effective, require formal technical training and a "... sound educational foundation in their discipline so they can keep abreast of new technologies and be responsive to change" [12, p.219].

In recent times there has been concern, what only can be referred to as a panic as IS professionals are considering how to incorporate aspects of electronic commerce into IS curriculum. Initially there was a plethora of new subjects proposed which were primarily existing subjects with "e-" preceding the subject name. It was felt that many universities did this to gain a competitive advantage through the "first mover" principal. As academics began to grasp many of the new concepts of the e-world and their implications, the use of the term e-commerce was slowly replaced by the term e-business. E-business differs from e-commerce in that it relies on the integration of business processes and the supporting technologies to gain competitive advantage across the extended supply chain. It is more strategic in nature and requires greater skill sets than e-commerce due to the front-end back-end integration.

As an academic study, IS needs to educate students in the efficient and effective application of all components of an information system (computer hardware, software and people) to solve business and organisational problems. There have been a number of studies which have attempted to identify IS graduate skills and the resultant curriculum.

The IS'97 Model Curriculum [3] was a collaborative development between industry and academia. The model provided guidelines and resources to facilitate the development of quality undergraduate IS curriculum. Interestingly, this model curriculum, just four years old, makes little mention of electronic commerce or e-business. However the recent revision to this model curriculum (IS 2002) places far more importance on the role of e-commerce.

In the USA, the National Science Foundation [7] sponsored a task force of both industry and academic participants in an attempt to identify the IS skills relevant for the development and use of large information systems. The skills were categorised into Personnel Skills, Interpersonal Skills and Technical Knowledge and Skills. However even though the document acknowledged the importance of enterprise wide systems, it made failed to recognise the extension of these types of systems into the e-business arena and the skill requirements to support this extension. The resultant Information Systems-Centric Curriculum Document [7] recommended an inverted curriculum approach which allows students to experience and analyse real application systems from the beginning of their course [9]. This requires students to take greater responsibility for their learning with academics taking on the roles of mentors. An essential recommendation was the ongoing collaboration with industry to enable meaningful project activities, site experiences, case studies, and assistance in updating the curriculum.

In 2000 the U.S. Departments of Commerce, Labour and Education released the 21st Century Skills report designed to identify skills required by students to work in the "digital age". The report identified a number of broad generic skills but made little reference to specific IT skills [13].

The massive number of IT vacancies around the world, Australia 30,000 (Information Age, 1998), USA 200,000 and Germany 90,000 (The Australian, June 2000) have resulted in governments and industry conducting studies to identify the specific skill shortage areas [13] [2].

The Deloitte [4] report mapped E-skills into 9 super-types:

- Internet & multimedia,
- Application development,
- Web development tools,
- Operating systems,
- Internetworking,
- LAN administration,
- System software and support,
- Database management,
- Communications installation and maintenance.

The National Office of Information Economy reported that 37% of business identified lack of skills as a major barrier to business use of e-commerce [11].

The incorporation of e-business and related issues into university curriculum has been driven by a number of factors:

- Analyst's projections of the enormous growth in this market [1].
- Student's realisation of the potential lucrative job market.
- Industry looking for graduates with the appropriate skill set and
- Academics attempting to keep abreast of current issues in the information technology industry.

The challenge for IS academics is to modify their curricula to embrace the concepts of e-business as to provide graduates with the necessary skills to assist business enterprises in the future.

Many IS departments have spent much time and resources in modifying their curriculum to incorporate Enterprise Resource Planning Systems (ERP) [6] [8] [14]. These systems are seen as a tool to reinforce many of the IS concepts. To facilitate the inclusion of ERP systems into the curricula universities formed strategic alliances with many of the major ERP vendors [5]. The ERP vendor benefits from these alliances by increasing the supply of skilled graduates that can support their product thereby enhancing its marketability and lowering the cost of implementation while the university gains access to the software at a greatly reduced cost. One such alliance is the SAP University Alliance. Through these alliances, universities have made a commitment to incorporate ERP systems into their curriculum and have expended an enormous amount of effort and resources to achieve this. For many of these universities it is important to investigate how they can leverage their current level of expertise in ERP systems curriculum to incorporate many of the ERP e-business tools to support the teaching of e-business concepts. ERP systems are considered by many as essential component of any e-business strategy. This paper examines the potential use of ERP systems as a tool to teach e-business concepts. The paper will focus on SAP's ERP system as they are the market leader and have the largest university partnering program in the Australasian region.

## 2. SAP and e-Business

Since SAP's R/3 Release 3.1, a number of Internet-enabled applications via the inside/out approach have been made available. The Internet applications are developed to add a web user interface to existing SAP transactions. Since then SAP has offered more and more e-functionality especially in its more recent release, mySAP. SAP is now touted as the platform for many companies e-business strategy. Its various components support e-business through the intranet, business to consumer (B2C) and Business to Business (B2B) models. It does this from both a technical and business perspective. The relationships between these components can be summarised in Figure 1.

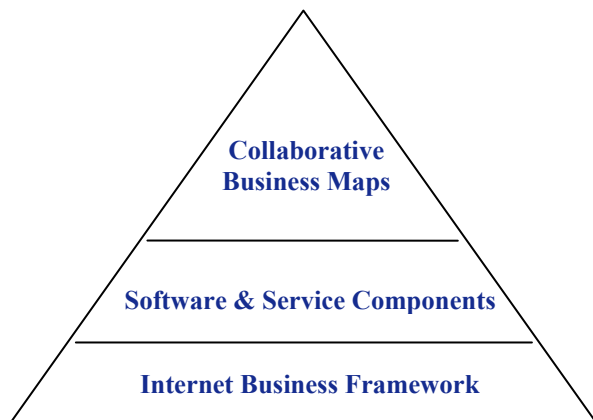


Figure 1: SAP e-functionality

The remainder of the paper will describe the various components contained in the ERP system and how they could be incorporated into an IS curriculum to teach e-business concepts.

### 3. Internet Business Framework

To support the evolving nature of software and particularly ERP systems, SAP developed its Business Framework. This framework facilitates the introduction of new software modules that are incorporated in the ERP system or new components that must interact with the system. This includes non-SAP software that must interact with the ERP system. The Business Framework enables open, integrated, component-based enterprise business application solutions to be produced. For example, using the Business Framework, a company's own IT systems could be coupled with those of customers and vendors. Customers can employ the Internet to shop—their Internet orders are transferred to the order management system and automatically executed through all the processing steps to delivery. Vendors can have access to specific parts of their customers' warehouse management systems, allowing them to independently schedule their deliveries.

The Business Framework adopts a top down approach utilising the following components:

- **Business Components.** These are defined encapsulated business functions such as modules (Human Resources, Logistics, Financials) and functional software (Business Warehouse, Knowledge Management).
- **Business Objects.** An object-orientated approach is adopted to define the objects involved in a particular business process such as customer and invoice.
- **Interfaces.** These provide an open access to business components via standard access methods. This is achieved via BAPIs (Business Application Programming Interfaces), which are the methods or functions assigned to each business object. BAPIs act like interfaces for controlled method calls between SAP business objects and objects of external providers. BAPIs are open interfaces to make certain that when two application systems communicate with

each other, the business-related information such as customer, order or part number, all uses the same semantics. BAPIs form the foundation of SAP's Internet strategy by providing an object-orientated interface between different business components.

- **Integration Technology.** SAP incorporates integration technology that supports industry standards such as CORBA, XML, COM+ and EDI to enable open access to SAP and non-SAP components.

BAPI's provide students, studying IS access to business data and processes following an object-oriented programming model. BAPIs can be called using object-oriented interfacing technologies, such as Microsoft's COM/DCOM (Component Object Model/Distributed Component Object Model), thus enabling software components from SAP and third parties to interact freely.

In addition BAPIs can be accessed from all development platforms that support the SAP Remote Function Call (RFC) protocol. For example, Microsoft's Visual Basic environment supports this protocol. As Visual Basic (VB) is frequently used as the programming language for introductory programming, students are able to use their VB skills as a conduit to accessing an object-oriented programming model within the Business Framework of SAP. For example, we set our students a programming task to write a VB application that incorporates BAPIs, to remotely log into our SAP system and retrieve customer information.

### 4. Software and Service Components

The software and services provided by SAP for e-business are primarily provided by Internet Application Components (IAC). Since SAP R/3 version 4 has contained more than 35 IAC's. An IAC defines a complete internet application consisting of a transaction from the ERP system and the corresponding HTML templates. Traditionally for a user to interact with SAP R/3 they required a reasonable level of training and expertise. This becomes a serious barrier when a company expects customers, potential clients, vendors, business partners and other employees to interact with the system as is the expectation with e-business. Through the use of IAC's, the HTML display is user-friendly and functional providing users with an easy-to-use interface.

IAC's can be broadly categorized into electronic retailing, customer service, purchasing, employee self service and internal services. The OnLine Store is an example of a supplied IAC. The Online Store is a business to consumer (B2C) solution provided to customers in a standard SAP system. It has all the standard features of many online shopping facilities. Its electronic catalogue interacts with SAP's sales and distribution module to display products, descriptions and inventory levels. The online store incorporates the standard "shopping cart" functionality for the identifying of goods to be purchased. It also incorporates various

payment methods for the purchasing of the goods in the shopping cart.

The OnLine Store facility in SAP could form the basis of an e-business curriculum. It enables students to determine and enter the master data which needs to be created to support the products which are to be included in their online store. They can design their product catalogue to display the products available through their store. It would provide students with an understanding of the business process used to support B2C transactions. They could track the placement of online orders sourcing, picking billing, delivery and changes in inventory levels. They can explore the accounting documents that are generated with this type of transaction. From a business perspective they can produce a variety of reports to demonstrate the performance of their store.

The OnLine store provides students with a practical understanding of the business concepts of B2C, students can also explore it from a technology point of view. The IAC's rely of SAP's Internet Transaction Server (ITS) to map SAP R/3 screens to a HTML format. It provides the necessary functional and performance characteristics required to execute R/3 transactions. The application logic remains within the R/3 system thereby providing an "inside-out" approach to e-business. Students in data communications units can use the ITS as a tool which can be configured. They can reinforce security issues, that they have covered, by using the firewalls and encryption capabilities of the ITS.

The architecture of the ITS supports the rapid development of web user interfaces for existing transactions and comes with a PC-based development tool ready for HTML template development - SAP@Web Studio. This development tool is well suited to users who have little technical background and are looking for a simplified way to create web applications. It operates, for the most part, in offline mode and requires almost no specific SAP knowledge. The newer version of SAP R/3 (4.6c) incorporates the Web Application Builder and has the advantages of an online development tool including repository access, reuse and navigation support. It allows for both the inside/out and the outside/in development styles that are used in building common web applications for SAP. Both these tools enable students to create their own applications based on the theoretical concepts they have covered.

At Victoria University we have a group of graduate students who are in the process of installing and configuring SAP's OnLine Store. Once installed this tool will be used throughout the Faculty to reinforce many of the e-business concepts taught in the various schools.

## 5. Collaborative Business Maps

SAP has developed collaborative business maps in an attempt to facilitate the transition of companies to an e-business environment. These maps define the activities, roles, system interfaces, and business documents required for business to business transactions using the ERP system. ERP vendors, in the past have argued that their

systems include "best business practice" and this claim applies equally in the e-world.

The business maps provide three different views of how a company can establish, implement and evaluate their e-business strategy:

- The Interaction View illustrates to companies how their business processes interact with their business partners' processes from an e-commerce perspective. It outlines which users should be involved and what business documents are exchanged.
- The Component View provides information on which technical aspects need to be installed to support the level of interaction as defined in the previous view.
- The Collaboration Scorecard provides a methodology to assess the return on investment for the ecommerce strategy.

The Business Maps provide a company with the necessary tools to develop, implement and assess their e-business strategy from a B2B perspective. This tool would be invaluable in a university setting. It would provide students with what is considered "best business practice" in the B2B environment. They would be able to examine the interaction of business processes between vendors and suppliers. They would become aware of the staff involved and the business documents exchanged. Also they would be exposed to the techniques used to determine return on investment of a B2B strategy. The collaborative business maps could be a foundation for e-business curriculum as they would provide an explanation of the main business processes and the necessary interactions. This teaching tool could be applied to e-business solutions in general.

Also available to students is the Solution Composer, which can be downloaded from the SAP web site free of charge. This tool enables students to modify existing business maps or compose new ones. By editing or creating their own maps, they can analyse and visualize the specific processes from case studies and discover how best to implement and support them in an e-business environment.

The e-business elements discussed above are relatively simple to incorporate into the IS curriculum. There are many other components that can also be used to reinforce e-business concepts but would require considerable effort to configure for student use. These include customer relationship management (CRM), mobile computing, e-procurement, employee self service and enterprise application integration functionality.

## 6. Conclusion

Many universities have struggled to incorporate ERP systems into their IS curriculum. They are now faced with the issue of how best to incorporate e-business. They often treat the two technologies separately without realising the synergy between the two. We have outlined how ERP systems curriculum can be extended to include e-business.

Before a university decides to build upon their existing ERP knowledge and resources to teach e-business concepts and skills in an IS curriculum, consideration should be given to the following questions:

- How is electronic business covered in the IS curriculum at present?
- If electronic business issues are to be addressed, then in what ways and to what extent should this be done?
- Can our existing ERP resources be extended to support the teaching of e-business concepts and skills?

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