

Integrating Enterprise System's 3rd Wave Into IS Curriculum

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Recommended Citation

Shankararaman, Venky; Kit Lum, Eng; and Dale, Simon, "Integrating Enterprise System's 3rd Wave Into IS Curriculum" (2012).

AMCIS 2012 Proceedings. 9.

<http://aisel.aisnet.org/amcis2012/proceedings/EnterpriseSystems/9>

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Integrating Enterprise System's 3rd Wave Into IS Curriculum

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ABSTRACT

This paper covers our observations that while enterprise systems are in their 4th Wave, current enterprise systems courses mainly cover the skills requirement up to the 2nd Wave. In this paper, we present our experience in developing an elective course (to address the 3rd Wave enterprise systems skills and knowledge) within the BSc Information Systems Management curriculum. This include the learning objectives and outcomes, curriculum context, course structure, lab content, assessments, student evaluation and industry feedback.

Keywords

Enterprise Systems, enterprise SOA, education, curriculum, SAP

INTRODUCTION

As enterprise systems evolve, it is necessary for enterprise systems education to keep pace with this evolution. (Hawking, McCarthy, and Stein, 2005) aptly called for the need to integrate ERP's second wave into higher education. In the late 2000s enterprise systems further evolved to incorporate Service Oriented Architecture (SOA) and Business Process Management (BPM) (Drobik, Desisto, Sussin, Shepherd, Rayner, and Hestermann, 2011). This 3rd Wave of enterprise systems are able to support flexible business processes by reusing existing process components that lay within the traditional ERP systems. Developing business solutions in this manner calls for new skills and knowledge. More recently, the 4th Wave of enterprise systems has emerged that integrate social networking (Cain, Mann, Silver, Basso, Walls, and Rozwell, 2011), mobility (Drobik et al., 2011; Prouty, 2011) and cloud solutions (Phelan, 2012). This paper presents the evolution of enterprise systems and highlights the additional outcomes required of enterprise systems courses to address the skills and knowledge required for the 3rd and 4th Wave of enterprise systems. It provides an example of how one university is addressing the 3rd Wave of enterprise systems education through the launch of an elective course within the BSc Information Systems Management curriculum.

EVOLUTION OF ENTERPRISE SYSTEMS: FROM INFLEXIBLE PROCESSES TO AGILE COLLABORATIVE PROCESSES

Figure 1 shows the evolution of enterprise systems over the last two decades along with the business and technology drivers for each Wave. In the 1st Wave, enterprise systems were monolithic mainframe systems that enable automation of an organization's operations by providing an organization-wide computing system with a single database that is shared across different business functions such as marketing, sales, manufacturing, logistics, finance and accounting. The emphasis was on automating tasks within these business functions (Kumar and Hillegersberg, 2000). The technology drivers were mainframe centralized architecture and database management systems. The business driver was task automation.

In the 2nd Wave, the emphasis was on driving the integrated end-to-end process that delivered consistent data to all business functions in real-time. This enhanced operational efficiency and when implemented correctly, reduced operational costs. Web became the preferred channel for conducting business. Enterprise systems were, therefore, adapted to the Internet. The various transactions within the enterprise systems could now be accessed by functional roles (e.g. sales person) through a web interface. However, the core of the processes defined within the enterprise systems remained inflexible and could not be changed easily without substantial coding effort. Furthermore, during this period, the scope of functionality expanded beyond ERP to include CRM, SCM, SRM, etc. The technology drivers were client-server architecture and Internet technologies. The business driver was integrated process across various business functions (Hawking et al., 2005).

In the 3rd Wave, the software industry started a major overhaul of the concepts and technologies used to build IT solutions. The thrust was to both adapt to the connected Internet world and drive business value through IT (Dubray, 2007). This was enabled by the standardization of protocols to integrate applications and develop loosely coupled and flexible business process solutions by leveraging Service Oriented Architecture (SOA) and Business Process Management Systems (Dubray, 2007). By late 2000s, enterprise systems also evolved to incorporate Service Oriented Architecture. Enterprise systems moved away from being monolithic to being able to support flexible business processes by reusing existing process components that lay within in the traditional ERP systems (Shankararaman and Eng Kit, 2011). This transformation is achieved by providing enterprise SOA layered architecture and tools for designing services and composing them into business processes. The technology drivers were SOA and Business Process Management Systems. The business driver was agile processes across various business functions which extend beyond one's organization. Exemplifying this, SAP released its SOA version of ERP – ECC 6.0 – in 2005, and since then the majority of its existing customers have upgraded to this version (Morrison, 2011), plus every new customer installation since then has been on this version. SAP now has over 30,000 customers running ERP worldwide, a sizeable market for the skills developed on these courses.

In the 4th Wave (2012 and beyond), three trends - namely mobility, social networking and cloud computing are bound to impact enterprise systems (Dobrik et al., 2011; Cain et al., 2011; Prouty, 2011; Phelan, 2012). Enterprise systems will further evolve towards being social network centric, where the boundary between enterprise systems and customers' social networks will begin to disappear.

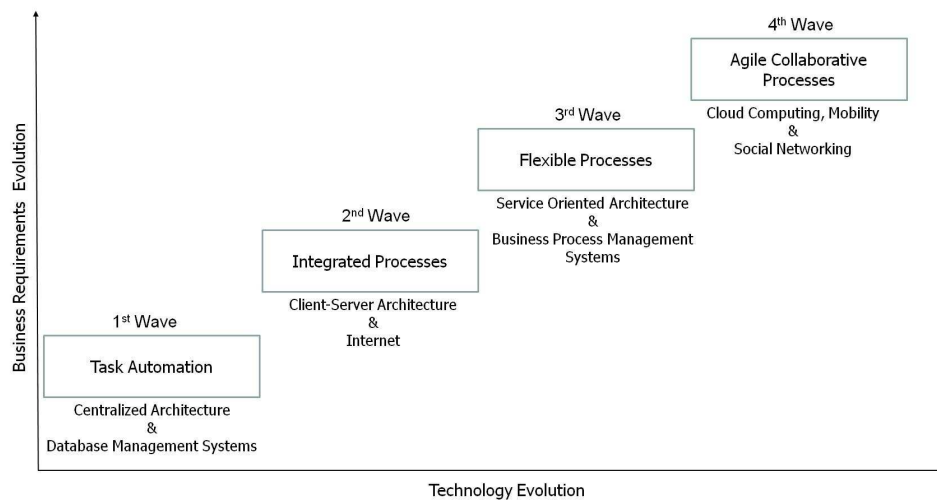


Figure 1. Enterprise Systems Evolution

This may also be labeled as Enterprise 2.0. A web of interconnected applications and services will enhance engagement with customers and provide capabilities for employees to be more competitive and productive (Patten and Keane, 2010). Organizations are leveraging these social networking tools such as Facebook, Twitter, LinkedIn and the like to engage and collaborate with customers. For example, a major Indian paint manufacturer launched a marketing campaign in Facebook and then converted some of the customer interests into sales orders in the SAP ERP system. Another example is Salesforce.com, which has combined social media with business systems through the Chatter application. Toyota is working with Salesforce.com to leverage the social media Chatter application to connect Toyota customers with their cars, their dealership, and with Toyota (Romanski, 2011). The Jam solution from SuccessFactors is another example, where organizations use social media such as an internal Facebook-like environment for all employees and integrate it with the HR processes. Additionally, better analytics solutions will be developed to infer knowledge and make decisions from both data from ERP and that collected from social media. Increasingly this analytics has to happen in real time and deliver dashboards on mobile devices. For example, the major Indian paint manufacturer mentioned above has deployed mobile tablet devices to its entire sales staff which gives them real-time access to act on the customer interests generated from social media via a new CRM app on the device.

With wider acceptance of cloud computing, organizations will continue to reduce IT infrastructure costs by moving to enterprise systems and BPM systems hosted on the cloud, and therefore, integration between systems in the external cloud and those within organizations will become more important (Koslowski, and Strueker 2011). Ease of access to ERP information has always been an issue for organizations both for internal employees and external partners and customers. This

has been mainly due to the limited interface capability of enterprise systems and the security issues restricting access to those users within the IT firewalls of the organization. However, this problem could very soon disappear since with the explosion of mobile devices, organizations are looking to mobility to extend and expand the use of ERP through better GUIs offered by mobile devices (Prouty, 2011).

ENTERPRISE SYSTEMS COURSES AND LEARNING OBJECTIVES

Universities across the globe have been using ERP systems to teach business processes and process integration (Bradford, Vijayarajan and Chandra, 2003); Rosemann and Watson, 2002; Strong, Fedorowicz, Sager, Stewart, and Watson, 2006). Hands-on experience in using these systems are seen to further strengthen a student's understanding of business processes and the integrative nature of processes across the various functional units in an organization (Seethamraju, 2007). For example, a student can visually see the financial implication of completing a task such as the "Post Goods Issue" within the Sales Order Process, when the Inventory-Trading Goods account is credited and the Cost of Goods Sold account is debited. More recently, many universities have adopted integrated-ERP simulation in their curriculum. The main benefits from these simulations are student motivation through game playing, better understanding on the role of enterprise systems in supporting business strategies, enhancing the conceptual knowledge underlying the enterprise system, learning skills to work collaboratively to achieve a common goal and some technical skills gained through performing transactions (Leger, 2006; Ellen and Mark, 2011). Some universities have also implemented ERP curriculum for teaching multinational cross-company collaboration through role play, where students in two different universities play roles such as vendor and customer and execute transactions in order to complete the procurement and fulfillment processes (Jaeger, Rudra, Aitken, Chang, and Helgheim, 2010).

Figure 2 shows a classification of various types of enterprise systems courses currently taught in majority of the universities (Hawking e al., 2005; Leyh, Winkelmann and Lu, 2011; Rosemann and Watson, 2002; Strong et al., 2006).

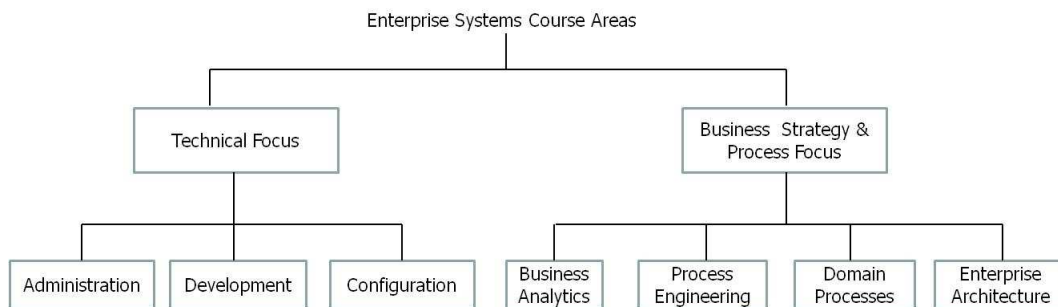


Figure 2. Enterprise Systems Course Areas

The technical courses focus on developing outcomes relevant to areas such as:

- Application Development, where using applications using programming languages related to enterprise systems such as ABAP for SAP, students learn to design and develop reports.
- Configuration, where students learn the concepts related to the organization of an enterprise system and learn to map the requirements of a given business scenario. For example, using SAP IMG (Implementation Guide for R/3 Customizing) to create the required "company code" "plants", "sales organization", etc.
- Administration, where the students learn the concepts and steps involved in administering the enterprise system by learning to create and manage user accounts, tune database performance, and monitor transactions.

The business courses focus on developing outcomes relevant to areas such as:

- Process Engineering, where students learn to model and analyze business processes using tools such as IBM Websphere Business Modeler (Walden, 2011), explore issues related to implementing process changes, understand the lifecycle of implementing an enterprise system and discuss the importance of integration with other applications within and across organizations.
- Domain Processes, where students learn the detailed activities related to the various business processes such as procurement, production planning, cost management, supply chain and human resources. By performing transactions

as an end user, students also learn to appreciate the integrated nature of the processes that cut across the functional domains of an organization.

- Enterprise Architecture, where students learn the importance of business and IT alignment and the role played by an enterprise system in enabling this alignment. They also come to appreciate the complexity of the various views of an enterprise - namely business architecture, application architecture, information architecture and technology architecture.
- Business Analytics, where students learn the steps involved in transferring data produced from the various transactions in the enterprise system and to analyze this data using appropriate tools such as SAP Business Objects or SAS Business Analytics to understand business impact, then model and predict future business strategy.

Majority of enterprise systems courses are still addressing the requirements of the 2nd Wave of the enterprise systems evolution - Integrated Processes. These courses were very relevant and addressed the growing need for skills in understanding integrated best practice processes and technical and managerial issues pertaining to configuring, deploying and managing the automation of best practice processes using enterprise systems.

However, moving forward, enterprise systems curriculum must address the demand for skills that cater to the 3rd Wave and 4th Wave of enterprise systems evolution. Jon Reed presents the following trends in enterprise systems and associated SAP skills requirements for the future (Reed, 2007; Reed, 2010):

- Model driven ERP and composite applications that will require future functional consultants to understand how different pre-defined business process components stored as enterprise services can be assembled to form end-to-end processes
- Increased use of mobile devices that will lead to more ERP data and process accessed through mobile interfaces. Hence, technical consultants will need to understand the business processes and work with the functional team to develop ubiquitous graphical interfaces for users to interact with the process
- Over time, configuration skills will become less important since enterprise systems components will be pre-configured for specific industries and SOA skills would allow for enhancements or customizations
- Move from “transactional” to “intelligent” ERP. This will require business intelligence, dash boarding, and master data management skills to develop solutions for reporting and executive decision making

More recently, SAP, which is a leading vendor of enterprise systems software, has identified three business areas of expansion namely mobile, cloud and in memory. All of these will expand the business around the core ERP applications (SAP, 2012). All of these will expand business around the core ERP applications and take it into new areas beyond the traditional functional and technical skills on the ERP and NetWeaver platform. Going forward, therefore, what will be needed more are the architectural skills to design and then implement an efficient and cost effective solution that extend business processes to a wider user group, provide access to data from ERP on pervasive devices, integrate data from social media with ERP, and enable high performance real time analytics.

This is particularly true for developing countries where new implementations will be based on 3rd Wave and 4th Wave enterprise systems. Hence, this will add a new dimension to the skills shortage predicted for enterprise systems as discussed in (Hawking, 2010). Therefore, moving forward, enterprise systems must incorporate the following outcomes that will make them more relevant to the future skills requirement.

The technical courses must focus on developing additional outcomes relevant to areas such as:

- Application Development, where students learn to implement process driven applications from existing services using SOA and BPM tools, understand the layered architecture of composite applications, develop pervasive user interfaces for various human activities within the process, integrate with applications in the cloud using SOA, leverage publicly available APIs to build socially-enabled applications, and provide access to all of this on mobile devices.
- Administration, where students learn to deploy and manage applications to a cloud infrastructure, manage interactions with more open architecture applications such as Facebook and Twitter and design access control mechanisms for the entire solution.

- Business Analytics, where students learn to implement real time data analytic applications, and manage the data coming from both transaction data from ERP and other business applications, as well as data from social networking and mobile applications.
- Development and administration of mobile solutions and that are integrated with ERP.

The business courses must focus on developing additional outcomes relevant to areas such as:

- Process Engineering, where students learn to model collaborative processes that include best practice and own practice processes, explore issues related to implementing processes that are flexible, understand the new lifecycle of implementing an enterprise system where process composition is the major focus, understand the business value and challenges in integrating social media and mobility solutions with enterprise systems and plan for incorporating cloud components in ERP applications.
- Enterprise Architecture, where students learn the impact of cloud computing and mobility on the various views of the enterprise architecture such as business architecture, application architecture, information architecture and technical architecture.
- Business Analytics, where students learn the importance and challenges in developing real time data analytic applications, where the data includes both transaction data from ERP and other data from social networking and mobile applications.

In order to address the skills requirements of the 3rd Wave enterprise systems, we at the School of Information Systems, developed a course titled “Enterprise Business Solutions (EBS)”. Our journey started in 2007 with a meeting with Infocomm Development Authority of Singapore (IDA) to explore the possibility of developing a course in enterprise systems that addressed the current needs of the industry. We then successfully obtained funding from the Ministry of Education (MOE), Singapore to develop the EBS course.

In the next section, we describe the IS curriculum context within which the EBS course is taught, learning objectives and outcomes for the EBS course, course and lab structure, assessment methods and course evaluation and feedback from both industry and students.

ENTERPRISE BUSINESS SOLUTIONS (EBS) COURSE

Curriculum Context

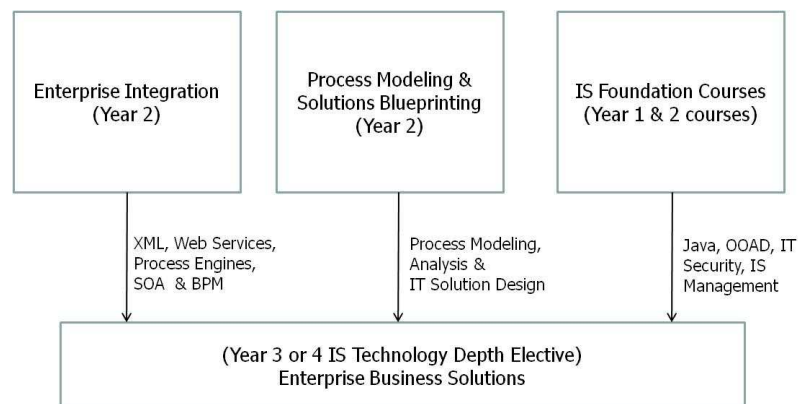


Figure 3. Curriculum Context

The EBS course is offered as an IS Technology Depth Elective to students who are in their 3rd or 4th year of the BSc (ISM) program. Students coming into this course have basic object-oriented application development (OOAD) and java skills. In addition, students are required to take (or be exempted from taking) the Process Modeling and Solutions Blueprinting (PMSB) and Enterprise Integration (EI) courses to ensure that they have a foundation in business processes and enterprise integration technologies before being able to develop enterprise business solutions using enterprise systems such as SAP ERP (See Figure 3). Thus students starting the EBS course have hands-on experience in modeling and analyzing business

processes using tools such as Websphere Business Modeler (Walden, 2011), developing XML documents and SOAP-based web services using tools such as Axis, business process automation using process engines (e.g. TIBCO Business Works) and have conceptual understanding of enterprise integration topics such as SOA and BPM. However, they lack detailed knowledge of enterprise processes such as procurement, fulfillment and production planning. For this, we leverage on existing content available through SAP University Alliance Program (UAP). The EBS course, therefore, focuses on leveraging this existing content and integrating it with the required knowledge and skills for designing solutions using the 3rd Wave of enterprise systems.

Learning Objectives and Outcomes

The EBS course focuses on the following learning objectives.

Upon completion of the course, students must be able to:

1. Explain the fundamental concepts of an enterprise system (e.g. SAP ERP) and how it supports a business.
2. Conduct a detailed walkthrough of some business processes in an enterprise system (e.g. Fulfillment).
3. Configure an enterprise system (e.g. SAP ERP) for a company and execute a business process.
4. Analyze the relationship between some of the modules of an enterprise system in the context of a business process (e.g. influence of Procurement process on the Materials Management (MM) module in SAP ERP).
5. Design and implement an enterprise SOA solution by using an appropriate enterprise system (e.g. SAP ERP) and enterprise SOA and BPM tools (e.g. SAP Netweaver Composition Environment and BPM).

Table 1 shows the learning outcomes to be achieved by doing this course along with the assessment methods. As seen in Table 1, in some instances a particular learning outcome is assessed by more than one assessment method. More details on the assessment methods are given in a later section.

Learning Outcomes	Assessment Methods
Explain the importance of enterprise systems (e.g. ERP) and their role in automating business processes in the context of consumer products (e.g. bikes)	Project 1, Final Test, Labs and In-Class Exercises
Define enterprise SOA requirements for automating a business process using enterprise services and external web services	Project 2
Configure SAP ERP based on business requirements	Project 1, Final Test
Implement enterprise SOA solution using appropriate technologies	Project 2
Explain the function and purpose of some SAP ERP modules (e.g. SD, MM) Explain the various steps and the business documents involved in the fulfillment process and procurement process Execute the fulfillment and procurement processes in SAP ERP Explain the purpose of the various layers of a composite application Design and implement the different layers of a process driven composite application Map components such as process, service registry, service interface, etc. to the appropriate layers of a process driven composite application	Project 1, Project 2, Final Test, Labs and In-Class Exercises

Table 1. EBS Course Learning Outcomes and Assessment Methods

Course Structure and Content

The course extends over a fourteen week period with a class contact time of three hours per week. The first three weeks are allocated for learning objectives 1 and 2, followed by three weeks for objectives 3 and 4, and the remaining six weeks focusing on objective 5. Two weeks are allocated for project presentations. External industry speakers are invited to share their experience with students and a focused set are invited for project presentations. We first defined the learning objectives and outcomes for the course which were then discussed with the relevant members of the School of Information Systems (SIS) industry advisory board. Once this was confirmed, we then proceeded to develop the detail course content. We realized that SAP UAP (University Alliances Program) had enormous content for teaching concepts related to the core ERP processes

along with hands-on labs. Rather than re-invent the wheel, we decided to adapt this content to suit the learning objectives 1, 2, 3 and 4.

For addressing the learning objective 5, no ready content (that had an end-to-end business scenario for composite application) was available both in SAP UAP and SAP Developer Network (SDN). In order to develop content for this part of the EBS course, we adopted the model shown in Figure 4.

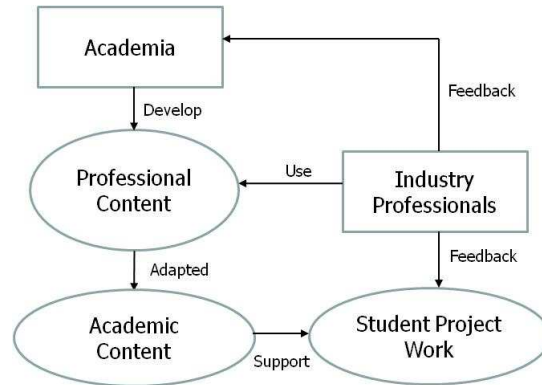


Figure 4. Content Development Model

Therefore, we developed a set of tutorials for SAP professionals by using various literatures from SAP, which covered the concepts of process-driven composite applications and hands-on exercises on using SAP tools. This content is hosted at SDN (Shankararaman and Eng Kit, 2010). A number of professionals used this content and gave us valuable feedback. Using this additional knowledge, we worked on adapting the material into academic content suitable for undergraduate students. The adaptation was carried under three themes. Firstly, alignment of content with the prior knowledge the students had gained in the pre-requisite courses - namely EI and PMSB. Secondly, adding more explanations and questions to motivate students to think of the concepts when they are doing the hands-on work. Thirdly, revising the content to reflect how the various components such as ERP, Composition Environment, etc. are configured for the SIS lab infrastructure. Once we had the labs in place, it was easy to develop the lecture and case study content for the course. The student project assignments were designed to map with the learning objectives. Industry professionals were invited for the project presentation and some projects which were very innovative were chosen to be showcased in the SDN for industry professionals to view and give feedback. For example, last year one of the teams integrated Xbox Kinect with SAP Netweaver BPM and ERP where process activities could be performed by using hand gestures and voice.

Project Assessments

Projects form the core of the assessments for this course. The first project is a configuration project and contributes to 20% of the marks. The motivation of this project is to ensure students have hands-on experience in configuring some parts of the SAP ERP to implement an enterprise solution that supports the basic fulfillment and procurement processes. Since this is similar to other enterprise systems courses, we will elaborate on the second project which is unique for the EBS course.

Project 2 - Designing and implementing a process-driven composite application (3 weeks; 40%)

The motivation of this project is to ensure students have hands-on design and implementation experience in creating a process-based composite application using SAP Netweaver Composition Environment tools. Each student group will come up with a custom scenario beyond the standard fulfillment and procurement processes and create a process-based composite application that utilizes SAP NetWeaver BPM for process modeling and execution, Visual Composer for user interface generation and modeling, Business Rules for business logic and process flow, SAP Enterprise Services for reading & writing data to the ERP system, etc. In addition, they may also incorporate external web services and other technologies that may be relevant to the scenario. Examples include user interfaces for mobile devices such as the iPad as well as motion-sensing and voice recognition device (Microsoft Kinect) as an interface to performing transactions. At the end of Project 2, each student group will present their custom scenario and demonstrate what they have implemented and the other technologies that were incorporated.

Hands-on Lab Work

We have two sets of labs – one for an introduction to SAP ERP and the other for creating a process-based composite application. The first set of labs is subscribed and adapted from the SAP University Alliances Program and largely similar to

other enterprise systems courses. These exercises are performed in an ERP system hosted at University Competency Centre, Queensland University of Technology, Brisbane, Australia.

The second set of labs comprises of the following exercises (using SAP NetWeaver Developer Studio):

1. Create a Process-based Composite Application (using a Purchase Approval Process which consumes a create purchase order enterprise service in an automated activity)
2. Develop User Interfaces for the Process with Visual Composer (to replace the generated user interface in the previous exercise with a custom developed interface that consumes a create purchase request enterprise service)
3. Working with Business Rules (incorporating business rules in the Purchase Approval Process to direct the process flow based on whether an approval is required or not)
4. Modeling the Currency Converter application with Visual Composer (to demonstrate how an external web service can be consumed)
5. Displaying HTML Document (Map) in Visual Composer (to demonstrate how a map (e.g. google maps) can be displayed and mashed up with data from ERP)
6. Using Adobe Offline Forms (to replace the generated user interface for approving the request in the Purchase Approval Process with an Adobe form that is sent via email)
7. Service Composition – Create Purchase Order based on Purchase Requisition

These exercises are performed on the students' machines and deployed centrally to the SAP NetWeaver Composition Environment (which we installed, configured and administer in our school).

Some of the challenges we faced while developing these exercises include:

- Working with relatively new technologies and tools (early versions of SAP NetWeaver BPM)
- Keeping up with new versions, support packages and patches (re-testing the exercises numerous times)
- Making sense of the vast amount of information available in SDN and to adapt the materials to create a comprehensive step-by-step lab guide
- Ensuring that the exercises lay the groundwork for Project 2 such that the students are able to use the lab guide and re-create their process-based composite application from scratch
- Lengthy lab exercises, usually around 50-60 pages

Furthermore, we are unable to support a bigger class of students given the performance issue of the servers due to our small setup and limited administrative resource.

Course Evaluation and Industry Feedback

The EBS course has been offered three times since August 2009 and seventy four students have taken this course. The current run is expected to complete in April 2012. The course has been hugely popular among the students. However, since this course is highly specialized and requires a lot of computing resources, we restricted the intake to twenty five students per intake; hence, so far seventy five students have completed this course. At the end of each run, the students are asked to evaluate the course along three dimensions namely, course content, delivery and assessment. The average student evaluation over the last three runs of the course is around 4.28/5 which is considered an excellent score for a technical hands-on course.

Here is a selected set of comments from the students:

Liked

“The course is good as it provides students a good stepping stone to SAP ERP and the wonders of ESOA”

“This course allows me to learn more about SAP and evoked my interest in learning more about the features that are not taught in class”

“Understand business processes of organization and how ESOA/ES edge out the competitiveness of an Organization”

Disliked

“Going through a long and tedious configuration guide that does not value add much intellectually”

“Lengthy lab exercise due to the nature of the course so it is understandable”

As seen from the student comments, the course motivates some students to explore and learn on their own. This was further evidenced through the project demo where students had explored beyond what was covered in the class by learning from professional peers and technical forums. For example, in the last run students integrated ERP processes with Microsoft Kinect and mobile devices such as iPhone and iPad. This was one of the objectives we wanted to achieve, since the topic covered in the course is still emerging and bound to change over the next few years and students must learn to use professional networks such as SDN to gain further knowledge and skills. With regards to the dislikes, it is always a challenge to motivate students to do lengthy labs (e.g. 60 pages). Further probing of the students revealed that the problem lies in the fact that students are not able to link the lab steps to the concepts related to enterprise SOA and BPM and as a result, are less motivated to complete them. In the current run, we have been exploring ways to overcome this problem by explaining to students the concepts and linking them to specific lab steps, so that they think while doing the labs rather than taking a parrot approach to following instructions.

So far the industry feedback has been very encouraging and they see value in the skills and knowledge gained in the EBS course as being relevant to the 3rd and 4th waves of ERP evolution. In future we intend to hold an exhibition to showcase the projects delivered by the students. Here are some comments from the industry professionals who attended the student project presentations:

"... I was really impressed by the presentations and it was fantastic to see the students connecting the business scenario with the underlying technology, all too often graduates understand only the business OR technology but not both, clearly this elective is helping the students to appreciate the connection of business and IT. Nice to see the latest technologies like SAP NetWeaver BPM in the course, it was also really good to see how some of the teams innovated with Xcelcius, Google Maps & the Business Rules Engine..." (Paul Marriott, Vice President, SAP Platform & Technology, APJ)

"... it was good to see the students making progress with this consumer technology (Microsoft Xbox Kinect) and enterprise software combination..." (Simon Dale, Head of Technology and Innovation, SAP Asia Pacific and Japan)

CONCLUSION

Enterprise Systems Curriculum must evolve to address the skills and knowledge requirements of the 3rd and 4th Waves of enterprise systems. In order for this is to materialize, universities and institutes teaching enterprise systems must collaborate and with support from vendors, develop a curriculum framework and the needed courses. The EBS course is a first step in this direction which attempts to satisfy some of the requirements for the 3rd Wave by focusing on enabling students to develop flexible composite business processes by leveraging enterprise services. Over the last three runs, the EBS course has gained increasing popularity among students and is also seen by industry to drive innovative applications in the area of enterprise systems. Though, students coming to the EBS course have pre-requisite knowledge in SOA, BPM and Web Service technology, but they lack knowledge of enterprise processes and fundamentals of enterprise systems. Therefore, the first four weeks of the course has to be spent on getting students to understand and have hands-on experience with the sales and procurement processes. This severely affects the time available for covering in more in-depth the concepts and tools related to the 3rd and 4th Wave enterprise systems. Therefore, moving forward, we intend to launch another course that will cover the foundation of enterprise processes and enterprise systems. This will free some time for the EBS course to address other areas such as social networking and cloud computing and its relationship to enterprise systems.

ACKNOWLEDGMENT

The work reported in this paper was supported by Ministry of Education, Singapore, Grant No- TEF SMU 6 for the project "Turning a Class into an Enterprise".

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