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Annette Lerine Steenkamp
Lawrence Technological University
Southfield, MI 48075, USA

David J. Van
Lawrence Technological University
Southfield, MI 48075, USA

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An Approach to Teaching IT Life Cycle Processes

Annette L. Steenkamp
steenkamp@ltu.edu

David J. Van
davidvan@sympatico.ca

College of Management, Lawrence Technological University
Southfield, MI 48075, USA

Abstract

This contribution reports on an approach to teaching a course in information technology (IT) life cycle processes in a doctoral program of management in information technology. This program is designed for the practitioner scholar with high levels of managerial, technical and analytical expertise in the sub-fields of IT. The three credit hour course is one of five courses in the major track of the DMIT dealing with key information technology areas. The aspects of course design, pedagogy, assignments and team project are described with reference to an educational process model. The approach to course assessment and process modeling are summarized in terms of the course design criteria. The course offered a learning experience with learning outcomes in four categories, namely: 1. theoretical – the principles and methodologies of IT process modeling within the context of business processes; 2. informational outcomes in terms of leading edge trends in IT enabled business practice; 3. skill sets, such as the ability to improve the integration of IT life cycle processes into the business process model; and 4. informing of best practices as represented in national and international standards. The field of IT life cycle processes within an organization is addressed with focus on modeling the processes by which IT resources are acquired, maintained, supported, managed and aligned with the business processes of the enterprise. IT processes involve people, methods, techniques, procedures and computer-based tools, and the IT resources themselves. The ISO12207 set of standards were used as the baseline framework, and other frameworks, reference models and standards were referenced to inform individual and team assignments.

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1. INTRODUCTION

Organizations are challenged in the global marketplace in which competitors are devising new strategies and approaches to perform their business processes in ways that enhance value to all stakeholders (Orlikowski and Gash, 1996; Turner, 1998). Understanding the value chains relating to business partners, suppliers, and customers, and that improve the efficiency of employees has become an imperative in the contemporary organization (Luftman, 2000)

Several factors have contributed to the phenomenon of globalization, such as relaxation of traditional trade barriers, the adoption of trade agreements under the World Trade Organization, mergers and acquisitions across national boundaries, and new delivery technologies. E-business and information technology (IT) systems are viewed as key enablers in the global business environment of today (Weil and Ross, 2004). IT processes must now be planned and integrated into the business process model for optimal advantage (Boehm and Turner, 2003). In most

successful enterprises business processes are carried out, or are supported by IT-based systems (Feurer et al, 2001). Some have adopted new approaches to IT systems procurement over the last decade leading to practices of outsourcing and off-shore development. Such procurement strategies have been driven largely by financial considerations focusing on acquisition and supply of quality products and services at the lowest cost. In the educational arena IT and information systems (IS) programs are struggling to address strategic planning, acquisition and deployment of IT systems within the context of this business reality (Mendonca, 2003).

This contribution describes an approach to teaching a course in IT life cycle processes in a doctoral program in management in IT. IT life cycle processes are concerned with the processes by which IT resources are acquired, maintained, supported, managed and aligned with the business processes of the enterprise. The approach aimed to achieve learning outcomes in four categories, namely: 1. theoretical outcomes – the principles and methodologies of IT process modeling within the context of business processes; 2. informational outcomes in terms of leading edge trends in IT enabled business practice; 3. skill sets, such as the ability to improve the integration of IT life cycle processes into the business process model; and 4. informing of best practices as represented in national and international standards.

Section 2 describes the course design, Section 3 reviews the focal theory and the background context, Section 4 presents the course requirements for individual and teamwork, and Section 5 summarizes the learning experience with some feedback of the lessons learned in the course. The Annexure contains a selection of deliverables produced by a student for the individual assignments.

2. COURSE DESIGN

The course is a three credit hour course in the major track of coursework for the doctoral program. It is the first of five major courses dealing with key topic areas in IT. The other major courses are advanced data management, IT leadership and management, IT systems architecture and advanced topics in IT. IT processes involve people, methods, techniques, procedures, computer-based tools, and the IT resources themselves. The enterprises represented by students in the course have varying capabilities to perform IT processes and integrate these processes into the core value chains. The course design was influenced by several factors, such as the focal theory within the organizational context, the student profile and the advanced academic level of the course. In addition the following themes formed the basis of the design:

- Abstraction and modeling, referring to understanding and evaluating the problem space; creating solutions to system requirements. This theme involved cognitive dimensions at levels 5. Create and 6. Evaluate of the revised Bloom's Taxonomy (Bloom, 1956; Anderson and Krathwohl, 2001).
- Process-orientation, referring to IT life cycle processes within the context of business processes. Most documented standards and real-world practices focus on processes of a particular context, such as software processes, manufacturing processes or business processes without adequately addressing alignment and integration between them.
- Optimization, referring to the improvement of IT processes and their integration into the business process model. Here all cognitive dimensions are engaged and in particular level 4. Analyze, level 5. Create and level 6. Evaluate.
- Measurement, referring to the management of process and product by means of metrics derived from practical experience reported in the literature and experience of course participants.
- Reuse, referring to process-oriented frameworks, reference models and patterns for modeling.

Educational Goal and Objectives

The intent of the course was to provide students with both individual and a teamwork experiences in the categories and themes mentioned above. The goal was to provide a comprehensive perspective of IT life cycle processes needed in organizations in support of business processes, and the skills to introduce and manage such processes. In

support of this goal objectives were to provide skills and competencies to be able to:

- Identify and integrate IT life cycle processes in support of new business processes
- Be a key resource in business process automation
- Lead and manage IT processes in the managerial and contractual perspectives
- Manage the IT processes in the development and operational perspectives
- Identify and prescribe supporting processes and organizational processes that sustain other IT life cycle processes
- Lead, manage and participate in software process improvement initiatives within an organization.
- Identify, interpret and adopt best practices in the field of IT as promoted by international standards organizations.

Pedagogy

Given the goal and objectives the syllabus topics were systematically explored in both individual and teamwork, and in logical order so that individual competencies were developed prior to starting on the teamwork (refer to the educational process model in Figure 1). Complementing individual work with a team project has achieved positive results in the class room (McKendall, 2000; Stephens and Myers, 2001; Steenkamp, 2002; Chan, 2003). Considering the level of experience of the students the pedagogy encouraged knowledge sharing, participation, collaboration and exposure to real world issues. A methodological approach and process was followed to develop an individual proposal for an IT enabler that would support a new business initiative in an enterprise, and then to perform a feasibility study and project plan for implementing the initiative. These individual assignments required that students to perform process analysis and modeling at various levels of abstraction, and in various dimensions using a range of techniques. Knowledge and skills acquired by executing the individual assignments were further enhanced in the team project conducted by four teams in which virtual and in-person collaboration was mandated. Teamwork required teams to perform the first four phases of a business process redesign process for a given IT enabling initiative, depicted in Figure 3, following a prescribed methodology, with special attention to the IT systems relevant to the change initiative assigned to the teams. Communication skills were enhanced by means of oral presentations of individual and team assignments. Opportunities were given for critiquing own and peer deliverables enabling students to enhance critical thinking, interpretative and evaluative abilities.

Class Schedule

The course was offered on a weekend schedule by means of faculty lectures, guest, individual and team presentations, discussions and tutorials supported by the Blackboard Learning System. Students were encouraged to request meetings with faculty when needed, and arrange team meetings according to a pre-planned schedule.

Assignments

The requirements of the individual and teamwork assignments are summarized below, and elaborated in Section 4.

Individual Assignments Requirements: Each student was charged to propose a business initiative that would integrate the supporting IT processes. This required analysis and planning to produce an Initiative Proposal and Feasibility Report. Students were required to give a presentation on their initiatives. Presentations were videotaped for purposes of self-evaluation and review. Individual assignments are discussed in Section 4.

Team Project Assignments Requirements: Team assignments were based on a case study and project charter, and teams followed a team approach to produce the deliverables stated in the project charter. The team project is described in Section 4.

3. INFORMATION TECHNOLOGY PROCESS MODELING

In general a process model shows the sequence of, and relationships between, processes in a domain of concern, and also the relationships between processes in other domains, such as a super- or a sub-domain.

An IT process model presents the IT processes concerning the IT resources, i.e. the hardware, software and infrastructure,

such as a phased life cycle model. A business process model presents the business processes, some of which are IT enabled. Processes within an IT enabled organization have been classified into various taxonomies (Rummler and Brache, 1990; Wilcocks et al, 1998; IEEE, 2002; ISO, 2002; Applegate et al, 2003; Harmon, 2003; Luftman, 2004). Several categories of processes may be identified focusing on processes in the organizational context, processes relevant to a specific value chain, and processes to be performed when undertaking a business process redesign project. Table 1 presents process areas for these three categories, and process models with phases for each category. Note that several other process models are used for structuring specific viewpoints, such as quality management, configuration management, systems integration. Where a software development project is called for a life cycle model such as the Unified Process Model (Jacobson et al, 1999), a software process model (Wang and King, 2000) or an empirical model (Shull et al, 2001) is appropriate. The process areas of concern in the course assignments are shown in Table 1.

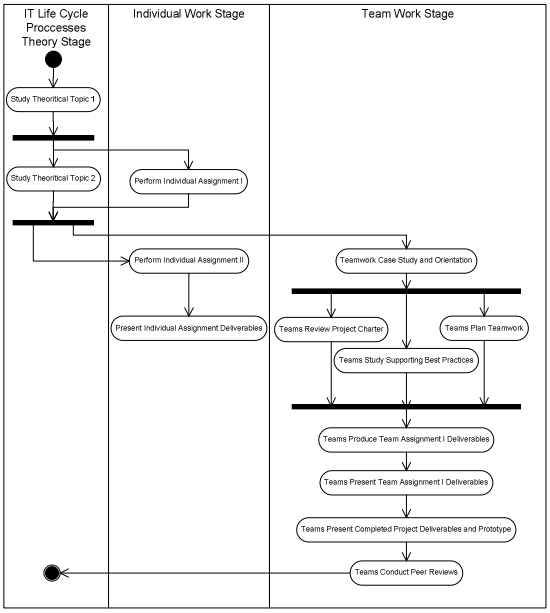

Figure 1 Educational Process Model

The course studied the IT life cycle processes specified in the ISO12207 standard (ISO, 2002), namely the primary, supporting and organization processes, in terms of the IT management process model given in Figure 2.

	Process Area	Process Model
Organization	Strategic Planning	Enterprise Management Process Model
	Enterprise Management	
	Asset Management	
	Business Process Architecture	
	Reuse Program Management	
	Domain Engineering	
	Human Resource	
	Quality Management	Total Quality Process Model
	Improvement	
Business/IT Value Chain	IT Strategic Planning	IT Management Process Model
	IT Management	
	Business Process Redesign	
	Alignment	
	IT Governance	
IT Project	Project Management Planning Monitoring Controlling	Project Life Cycle Model
	Primary Life Cycle Processes Acquisition Supply Development Operation Maintenance	Unified Process Model Acquisition Model
	Supporting Quality Management Configuration Management Documentation	

Table 1 Process Areas in an Organization

Alignment was addresses in terms of: 1. the IT strategic plan with the enterprise strategic plan, and 2. the IT project (that implements an IT enabling initiative) with the IT strategic plan by using the performance matrix shown in Table 2.

	Goals & Measures	Design & Implementation	Manage
Organizational Level	Institutionalize the enterprise strategic plan to be Agile Based on IT enabled value chains Focused on systems that meet organizational information needs Quantitatively measurable	Develop Enterprise Strategic Plan. Develop business and information architectures.	Plan, monitor, review and control execution of business strategy i.t.o. goals and measures.
Process Level	The IT strategy must Support and be aligned with enterprise strategy Meet goal and objectives of business process initiative Quantify measures	Develop IT Strategic Plan. Perform process analysis for IT enabling processes in support of business initiative. Extend IT processes relevant to initiative.	Plan, monitor, review and control execution of IT strategy i.t.o. goals and measures. Align IT strategy with enterprise strategy.
Activity Level	The IT enabling project must Support the business process Produce the deliverables in accordance with the project charter Be executed according to a project plan Quantify measures	Develop the project plan. Perform the technical tasks and activities of the IT project according to the stated process model and methodology (design and implement IT enabling system).	Plan, monitor, review and control the execution of the IT enabling project i.t.o. goals and measures of the project. Align IT project with IT strategy.

Table 2 Performance Matrix Applied from Harmon (2003), p31.

IT Process Framework

Process modeling was performed at the organizational, process and activity levels for the individual and teamwork assignments. Table 2 shows a performance matrix for a business initiative which is to be IT-enabled.

Figure 2 shows the IT management process model, based on ISO 12207, and the high-level flow of processes from the start of an IT project to closure.

Methodology and Notations

A methodology was developed for the course in support of the IT management process model and business process redesign process model. Table 3 shows the steps of the individual assignment processes, and Table 4 the stages, processes, steps and deliverables of the team assignment processes. The assignments for the course are discussed in Section 4.

The Annexure shows representative models of an IT enabling project developed for an individual assignment.

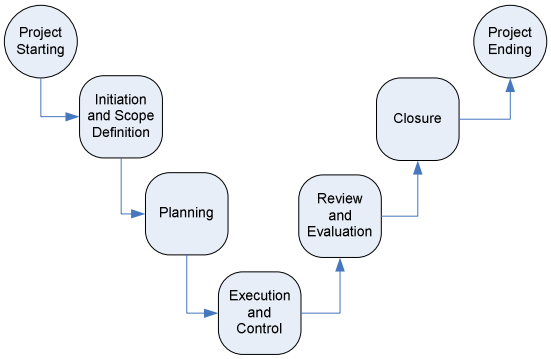

Figure 2 IT Management Process Model (ISO 12207)

A number of techniques and notations were incorporated to support the Initiation and Scope Definition, Planning, Analysis and Development processes. Techniques include:

- Value chain analysis using a value chain system diagram (an example appears in Exhibit 2).
- Alignment of the IT enabling project with the IT strategy, and with the enterprise strategy using a performance matrix (refer Table 2 and Appendix 3) and a process strategy matrix (refer Exhibit 3).
- Process analysis using a process matrix and process diagram (refer Appendix 2 and Exhibit 4).

4. ASSIGNMENTS

Individual Assignments

The individual assignments dealt with the processes of initiating and planning of an IT

enabler to support a new business initiative in a company or environment. A range of business initiatives to be IT enabled was proposed; some dealt with an e-business service for customers and business partners, while others focused on introducing a new product. Students adopted the IT management process model (Figure 2), and performed the activities of the first three processes, namely Initiation and Scope Definition, Planning, and Execution and Control shown in Table 3.

Planning for the acquisition process was done at a high level with the elaboration at the IT project level, where a process model was chosen, such as the one given in Figure 3. Execution of the actual IT acquisition processes was beyond the scope of the assignments. Selected deliverables for the individual assignments dealing with an E-Business initiative is presented in the Annexure.

Teamwork

Team assignments were performed in a team project based on the Ergonomics Case Study described by Harmon (2003).

Approach: The teamwork was performed according to a team approach (Steenkamp, 2002), which structures team-based, project-oriented processes into: planning, execution, evaluation and teamwork process improvement.

The processes described in the Project Management Body of Knowledge (PMBOK) (PMI, 2000) have proved valuable for detailing the activities of planning and executing team-based projects. The intent was to simulate a real-world project environment by grouping the students into teams giving them the opportunity to collaborate in developing the project deliverables.

Team members were assigned roles including a team leader, and all were briefed about the responsibilities of the roles. Teamwork was planned in terms of:

- Deliverables that achieved the project goal and objectives.
- Working within the context of the Analysis, Development and Transition stages on the case study business initiative assigned to a team.

Initiation and Scope Definition Process
Initiative Proposal Activity
Define Problem Statement (IT enablement initiative)
Describe the Business context
Perform Business Process Analysis
Identify Business Value Chain
Identify underlying Principles
Develop Process Strategy Matrix
Develop Process IT Matrix
Develop a Business Performance Matrix
Complete the organizational level (high-level business processes)
Complete the process level (with focus on IT enablement of a business process)
Complete the activity level (in terms of the IT life cycle processes and activities)
Prepare the Initiative Proposal
Planning Process
Feasibility Activity
Develop a High-level Plan to implement initiative
Perform Feasibility Study
Produce Feasibility Report
Execution and Control Process
IT Project Activity
Analyze the IT enablement processes of the Business Performance Matrix (activity level)
Determine acquisition strategy
Prepare Acquisition plan/ Development Plan for IT system to meet the IT enablement initiative

Table 3 Steps of the Individual Assignment Processes

- Teamwork was executed as a collaborative venture by team members, coordinated and managed by the team leader. Teams kept minutes of all meetings.
- Teams were supervised by faculty in weekly team tutorials throughout the team project.

- Team member performance was assessed at the end of the course by way of confidential peer reviews.

Team Project Charter: Each team should perform the first four stages of the Business Process Redesign Process Model (Figure 3) according to an IT process-redesign methodology focusing on the IT systems relevant to the change initiative assigned to it.

The change initiatives derived from the Ergonomics Case Study were allocated to teams as follows:

- Team 1: Create a portal that allows customers and prospects to make contact via the Internet.
- Team 2: Create a new supply chain system with all first-tier Ergo Chair part suppliers.
- Team 3: Examine the Ergo chair value chain to see where they could improve productivity by relying more heavily on the Internet, and to offer chairs for sale online via a portal that would also provide marketing information and service support.
- Team 4: Create an internal employee website that human resources would manage.

Stage	Processes and Steps	Deliverables
Planning (Team Assignment 1)		
	Develop an IT project plan (IT-PP) for the assigned project following the IEEE 1058 Standard for Software Project Management Plans.	IT Project Plan
	Consider and adopt technical process plans in the IT-PP for the redesign and development phases.	Prototyping Process Model
Analysis (Team Assignment 1)		
	Document the workflow relevant to the team's initiative.	IS, COULD Process Models
	Explore alternatives and choose the best redesign which achieves the goals of the initiative.	SHOULD Process Model
Development and Transition (Team Assignment 2)		
	Elaborate the IT-PP to include supporting life cycle processes and organizational life cycle processes.	Revised IT Project Plan
	Define the requirements for the prototype of the implementation that the team will develop.	Prototype Requirements
	Plan prototype	Prototype Plan
	Choose development environment	
	Develop prototype	Prototype
	Compile project binder	Project Binder
	Prepare project presentation	PowerPoint Presentation
	Present project to project sponsor	

Table 4 Stages, Processes, Steps and Deliverables for the Teamwork

5. SUMMARY AND CONCLUSIONS

The study of the theoretical body of knowledge was enriched by the exchange of experiences and insights gained from practice by faculty, students, and invited guests. Knowledge sharing was enhanced through discussion forums on the Blackboard Learning System.

Individual assignments allowed students to identify an initiative of own choice generating considerable engagement and increasing the perceived value of the assignments. The team project allowed students to apply theoretical knowledge to a case study following a team approach.

Teamwork ranged from excellent collaboration, utilizing individual competencies and experience, to poor team spirit, lack of engagement and loss of synergy. Positive team experiences are attributed to sound team management, team members' ability to

function in a team, and good personal competencies. Negative team experiences are attributed mainly to personality clashes, lack of engagement in the team project, and inadequate theoretical knowledge.

Further experience and data are needed to optimize teamwork at the doctoral level. Despite the mixed outcomes the learning outcomes were largely attained, as shown in Table 5, summarized in four categories. IEEE and ISO Standards used in the course are included in the list of References.

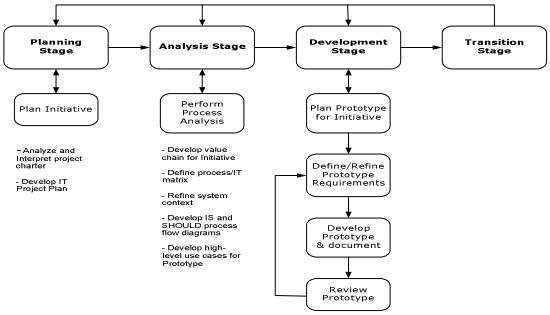

Figure 3 Business Process Re-Design Process Model

Category	Learning Outcomes
1. Theoretical outcomes	IT Life Cycle Processes within context of organizational processes
Individual	Process models BPR methodology IT alignment with Business strategy IT acquisition
Team project	Enterprise and IT strategic planning IT development and prototyping Quality Management
2. Informational outcomes	Leading-edge business practices for IT enablement and business process alignment
Individual	E-business services in contemporary practice
Team project	Enterprise information portal technologies Supply chain systems Online sales and Marketing HR Sub-portals
3. Skill-sets	IT Management competencies to initiate, plan, lead, manage IT enabling initiatives
Individual	Analytical Critical thinking, interpretation and evaluation Levels of abstraction in modeling Multi-dimensional thinking Presentation
Team project	Collaboration with culturally diverse team members Collaboration with members of varying skill sets and competencies Communication
4. Informing of practice	Knowledge and experience of several ISO and IEEE IT standards
Individual	ISO 12207, IEEE730, IEEE830, IEEE1058 CASE tools: Provision Workbench, Visio, Rational Rose
Team project	SCOR methodology BPR process model CASE tools: Provision Workbench, Visio, Rational Rose, Prototyping tools for Internet-based application development MS Project MSOffice

Table 5 Learning Outcomes of Course

6. ACKNOWLEDGEMENTS

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7. REFERENCES

Anderson, B. and D. Krathwohl, (Ed.), 2001, A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Addison Wesley, New York.

Applegate, L. M., R.D. Austin and F.W. McFarlan, 2003, Corporate Information Strategy and Management (Sixth Edition), McGraw Hill-Irwin, New York.

Boehm, B. and R. Turner, 2003, "Using Risk to Balance Agile and Plan-Driven Methods." Computer, June.

Bloom, B. (Ed.), 1956, Taxonomy of Educational Objectives Handbook 1: Cognitive Domain. New York: Longman, Green and Company.

Chan, S.S. , 2003, "A Team Project Approach to Teaching E-Commerce Development." Journal of Informatics Education Research, Vol.5, No. 2.

Feurer, R., K. Chaharbaghi, M. Weber and J. Wargin, 2001, "Aligning Strategies, Processes, and Information Technology: A Case Study." in Enterprise Systems Integration (J.M. Myerson, ed.), 11-28.

Harmon, P., 2003, A Manager's Guide to improving, redesigning and automating processes. Morgan Kaufmann.

IEEE Std 730, 1998, IEEE Standard for Software Quality Assurance Plans. IEEE.

IEEE Std 830, 1998, IEEE Recommended Practice for Software Requirements Specifications. IEEE.

IEEE Std 1058, 1998, IEEE Standard for Software Project Management Plans. IEEE.

IEEE Std 1362, 1998, IEEE Guide for Information Technology – System Definition – Concept of Operations Document. IEEE.

IEEE/EIA 12207.0, 1998, Software Life Cycle Processes. IEEE.

IEEE/EIA 12207.1, 1997, Software Life Cycle Processes – Life Cycle Data. IEEE.

IEEE/EIA 12207.2, 1997, Software Life Cycle Processes - Implementation Considerations. IEEE.

ISO/IEC 12207, 2002, Information Technology – Software Life Cycle Processes, ISO/IEC, Amendment 1. 2002-05-01.

ISO/IEC TR 15504-1, 1998, Information Technology – Software Process Assessment Part 1 – Concepts and Introductory Guide, ISO/IEC.

ISO/IEC TR 15504-2, 1998, Information Technology – Software Process Assessment Part 2 – A Reference Model for Processes and Process Capability. ISO/IEC.

ISO/IEC TR 15504-3, 1998, Information Technology – Software Process Assessment Part 3 – Performing an Assessment. ISO/IEC.

ISO/IEC TR 15504- 4, 1998, Information Technology – Software Process Assessment Part 4 – Guide to Performing Assessments. ISO/IEC.

ISO/IEC TR 15504-6, 1998, Information Technology – Software Process Assessment Part 6 – Guide to Competency of Assessors. ISO/IEC.

ISO/IEC TR 15504-7, 1998, Information Technology – Software Process Assessment Part 7 – Guide for Use in Process Improvement. ISO/IEC.

ISO/IEC TR 15504-8, 1998, Information Technology – Software Process Assessment Part 8 – Guide for Use in Determining Supplier Process Capability. ISO/IEC.

ISO/IEC TR 15504-9, 1998, Information Technology – Software Process Assessment Part 9 – Vocabulary. ISO/IEC.

ISO/IEC15288, 2002, Systems Engineering – System Life Cycle Processes. 2002-11-01.

Jacobson, I., G. Booch and J. Rumbaugh, 1999, The Unified Software Development Process. Addison-Wesley.

Luftman, J.N., 2000, "Assessing Business-IT Alignment Maturity." Communications of the AIS, Volume 4, Article 14.

Luftman, J. N., 2004, Managing the Information Technology Resource: Leadership in the Information Age. Pearson Education, Upper Saddle River, NJ.

McKendall, M. ,2000, "Teaching groups to become teams." Journal of Education for Business (May/June).

McNurlin, B.C. and R.H. Sprague, 2002, Information Systems Management in Practice. Fifth Edition, Prentice Hall.

Mendoca, J.A., 2003, "A Model and Sample Case for Teaching the Business Value of IT." Journal of IT Education, 2.

Orlikowski, W.J. and D.B. Gash, 1994, "Technological Frames: Making Sense of Information Technology in Organizations." ACM Transactions on Information Systems, Vol.12, No. 2.

Project Management Institute Standards Committee, 2000, A Guide to the Project Management Body of Knowledge. PM Institute.

Rummler, G. and Brache, A. (1990). Improving Performance: How to Manage the White Space on the Organization Chart (2nd Ed.), Jossey-Bass.

Shull, F., J. Carver, J. and G.H. Travassos, 2001, "An Empirical Methodology for Introducing Software Processes." ACM, 1-58113-390-1/01/09.

Steenkamp, A.L., 2002, "Standards-bases Approach to Team-based student Projects in an Information Technology Curriculum." Proceedings of the 17th Annual Conference of the International Academy for Information Management, Barcelona, Spain, December.

Stephens, C. S. and M. E. Myers, 2001, "Developing a Robust System for Effective Teamwork on Lengthy, Complex Tasks: an Empirical Exploration of Interventions to Increase Team Effectiveness". Proceedings of the 16th Annual Conference of the International Academy for Information Management, (December).

Turner, J. A., 1998, "The Role of Information Technology in Organizational Transformation." in Information Technology and Organizational Transformation, (edited by Galliers and Baets), Wiley.

Wang, Y. and G. King, 2000, Software Engineering Processes, Principles and Applications, CRC.

Weil, P. and J.W. Ross, 2004, IT Governance, How Top Performers Manage IT Decision-rights for Superior Results, Harvard Business School Press.

Wilcocks, L., D. Feeny and G. Islei, 1998, Managing IT as a Strategic Resource. John Wiley & Sons Ltd.

ANNEXURE E-BUSINESS INITIATIVE

Overview

This annexure contains selected deliverables developed for the individual assignment of the course for the IT Life Cycle Processes course, described in Section 4 of the paper. The assignment called for the IT enablement of a business initiative, with focus on initiating and planning of the IT component to support it. The appendices and exhibits contained in the annexure are intended to show examples of the models that were produced for an e-business initiative for InterExpress Inc., a fictitious courier services company based on a real world enterprise, to substantiate the Initiative Proposal and Feasibility Report. These two documents are nor included here, nor is the acquisition plan.

Purpose: The purpose of the initiative was to develop a proposal and feasibility report for an Internet-based order and tracking system for this courier service organization.

Scope: The individual assignment covered the first three processes of the IT Management Process Model. The Initiative Proposal was intended to serve the entire IT department and all the branches across the organization. The proposal would be part of the enterprise strategic plan, and the Feasibility Report is to inform the IT Strategic Plan.

Objectives

- To gain competitive advantages in the current courier and express package delivery services market by implementing the e-business initiative.
- To provide alignment between the IT and enterprise strategies, and link the project plan of the initiative to the IT strategic plan.
- Providing effective, scalable, and cost effective IT services to both internal and external stakeholders and users.

Approach

Following the IT management process model shown in Figure 2, the activities of the first three processes, namely the Initiation and Scope Definition, Planning and Execution and Control, shown in Table 3 were performed. Exhibit 1 shows the business context of the e-Business domain, which involves mainly Sales and Service, Customer Services/Support, and IT Development.

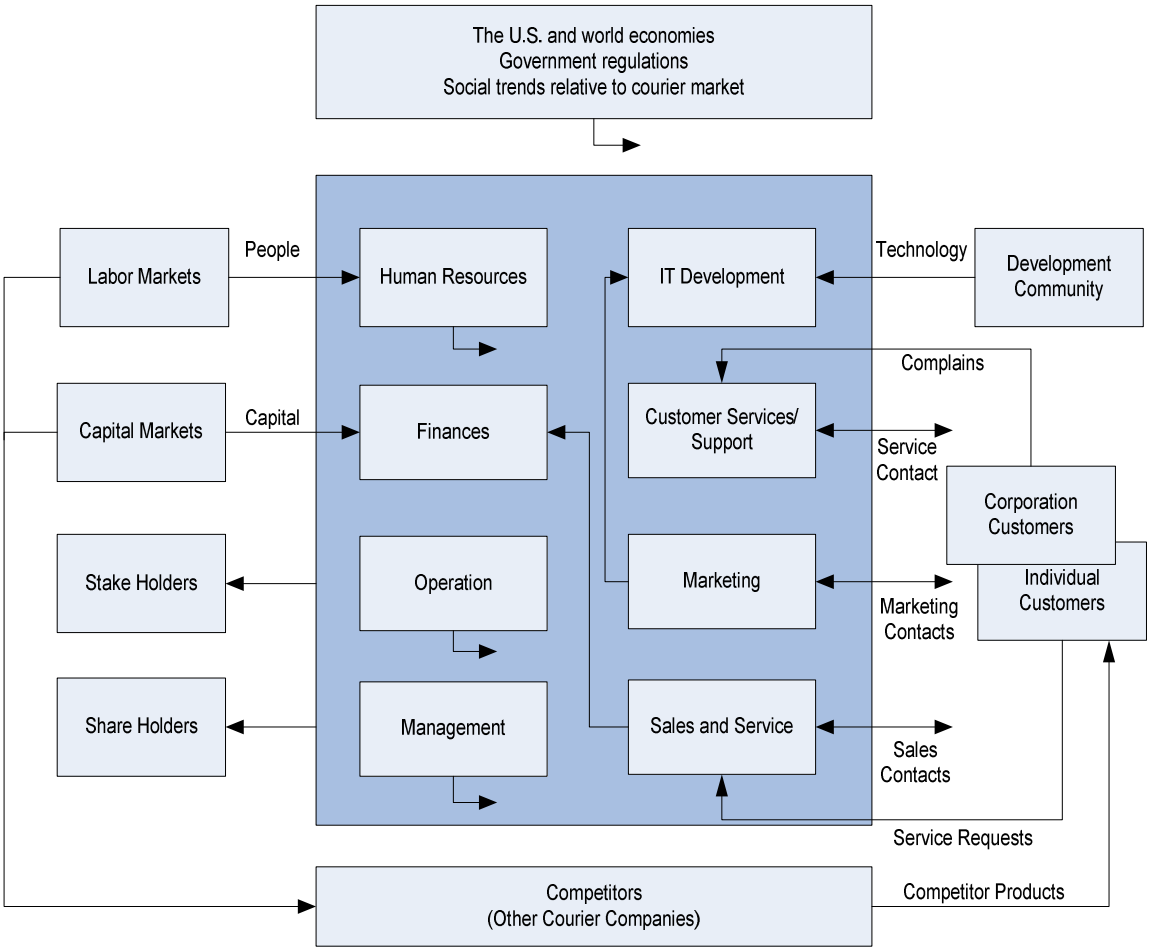

Exhibit 1 Business Context

As part of business process analysis the value chains for InterExpress Inc. were identified, as shown in Exhibit 2. Six values chains are considered in the business process redesign of the e-Business System.

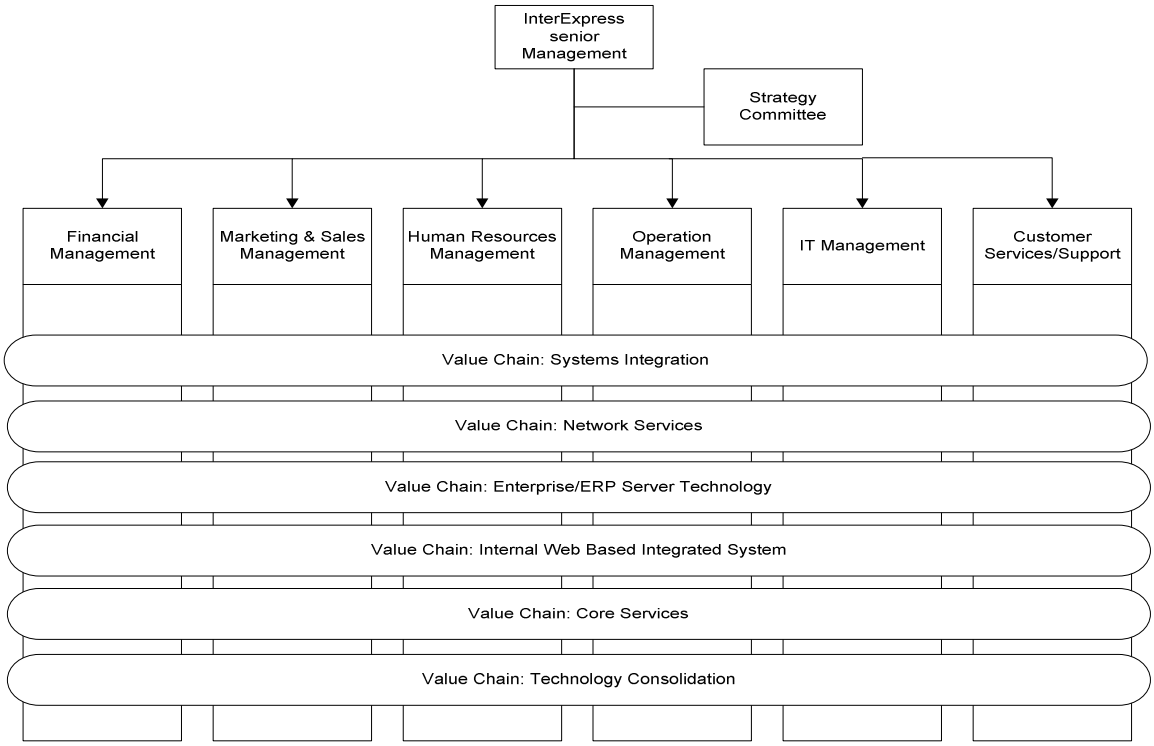

Exhibit 2 Value Chains at InterExpress

In analyzing the target process strategy the process strategy matrix, shown in Exhibit 3, was developed. The e-business initiative has high strategic importance for InterExpress Inc. and will entail a major redesign project, thus positioning it in the upper right quadrant of the matrix.

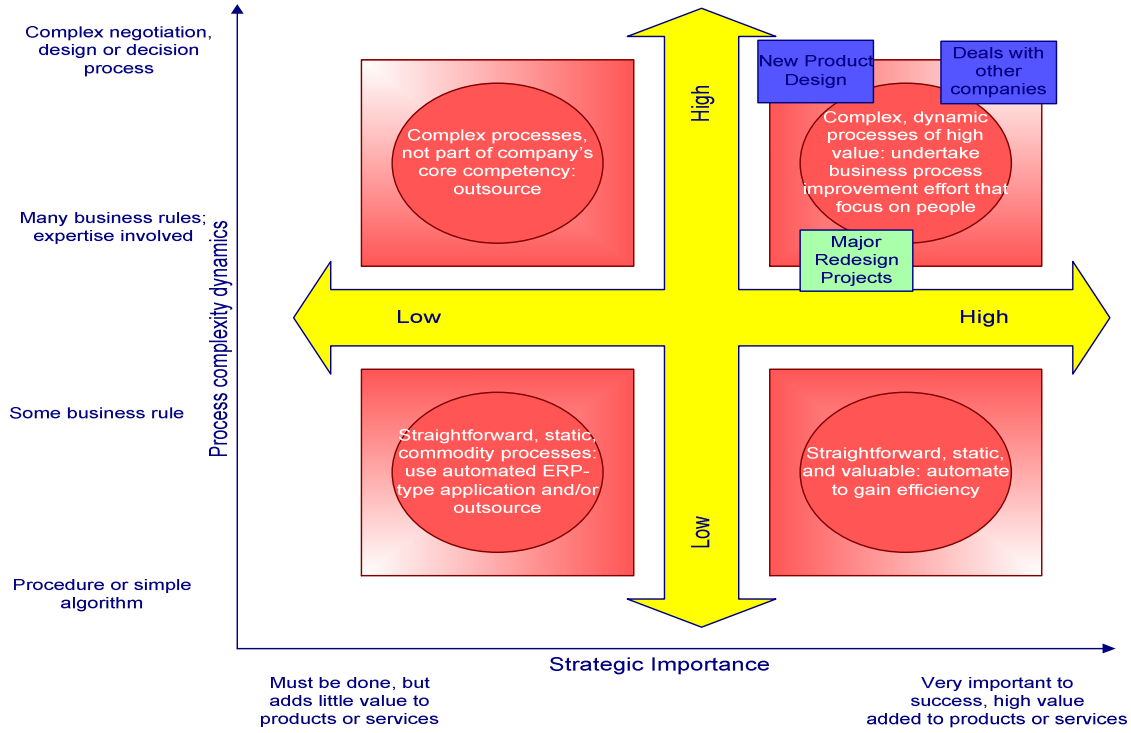

Exhibit 3 Process Strategy Matrix

A focused process and gap analysis of the order and tracking processes yielded the results presented in Appendix 1.

Process Outputs	Desired Performance	Actual Performance	Gap (If Any)	Impact of Gap	Cause of Gap
Customers complain - not receiving updated status on time.	Customers receive status updates after requests.	30% of time customers do not receive updated status.	30%	Customer dissatisfaction and frustration.	System integration problem.
Tracking information not updated on time.	Ordering/delivery status of package should be tracked immediately after customer request.	30% not showing the correct status of ordering/delivery of package.	30% incorrect status reporting to customers.	Customer dissatisfaction.	Systems integration problem. Web based ordering/tracking system not available.
Customers complain - long waiting time on	Customer should receive immediate as-	35% slower than original design.	35% slower.	Customer dissatisfaction.	Too few customer representatives. No

customer service call.	sistance.				web-based customer services system.
All orders must go through sales/service representatives.	Some orders should be done directly by customers.	40% slow in processing time vs. customer ordering rate.	40%	Customer dissatisfaction. Ineffective time management.	No web-based self -directed ordering system.
Slow information transfer among branches.	Distributed business units/ branches should have seamless information transfer.	25% delay in transferring/ information exchange is manual.	25% of information transfer slow.	Frustration among employees/ branch managers. Ineffective working environment.	System integration problem.
Accounting department not receiving timely payment.	Timely customer account information / payment available to accounting department.	15% recorded entries not meeting deadline for month-end processing.	15% not meeting target.	Accounting report incorrect – employees frustrated. Customers not receiving timely invoice updates.	System integration problem – accounting information exchange not timely.
Delivery staff not getting immediate status updates on customer requests.	Delivery staff needs immediate status updates.	13.8% delivery to incorrect address when customers make last minute requests.	13.8% missed customer request.	Customer dissatisfaction. Wasted resource time - sending delivery staff to wrong address.	System integration problem. Web based just-in-time customer request system not available.
Order details mis-entered by entry clerk.	All orders should be entered accurately based on customers' information.	5% mis-entered.	5% mis-entered.	Customer dissatisfaction. Delays.	Entry clerk inattention. Self- directed web-based ordering system not available.
Sales people take too long to submit orders.	Orders also placed by customers via web interface. Sales people should handle large volume corporate customers.	50% delay in processing orders.	30% of orders not meeting time critical matters.	Order delivery delayed, customer dissatisfaction	Sales people too busy. Self- oriented ordering system is available to customers.

Appendix 1 InterExpress Order and Tracking Process

Following on these results the IS business process diagrams were developed. Exhibit 4 shows the SHOULD business process diagram for order and tracking.

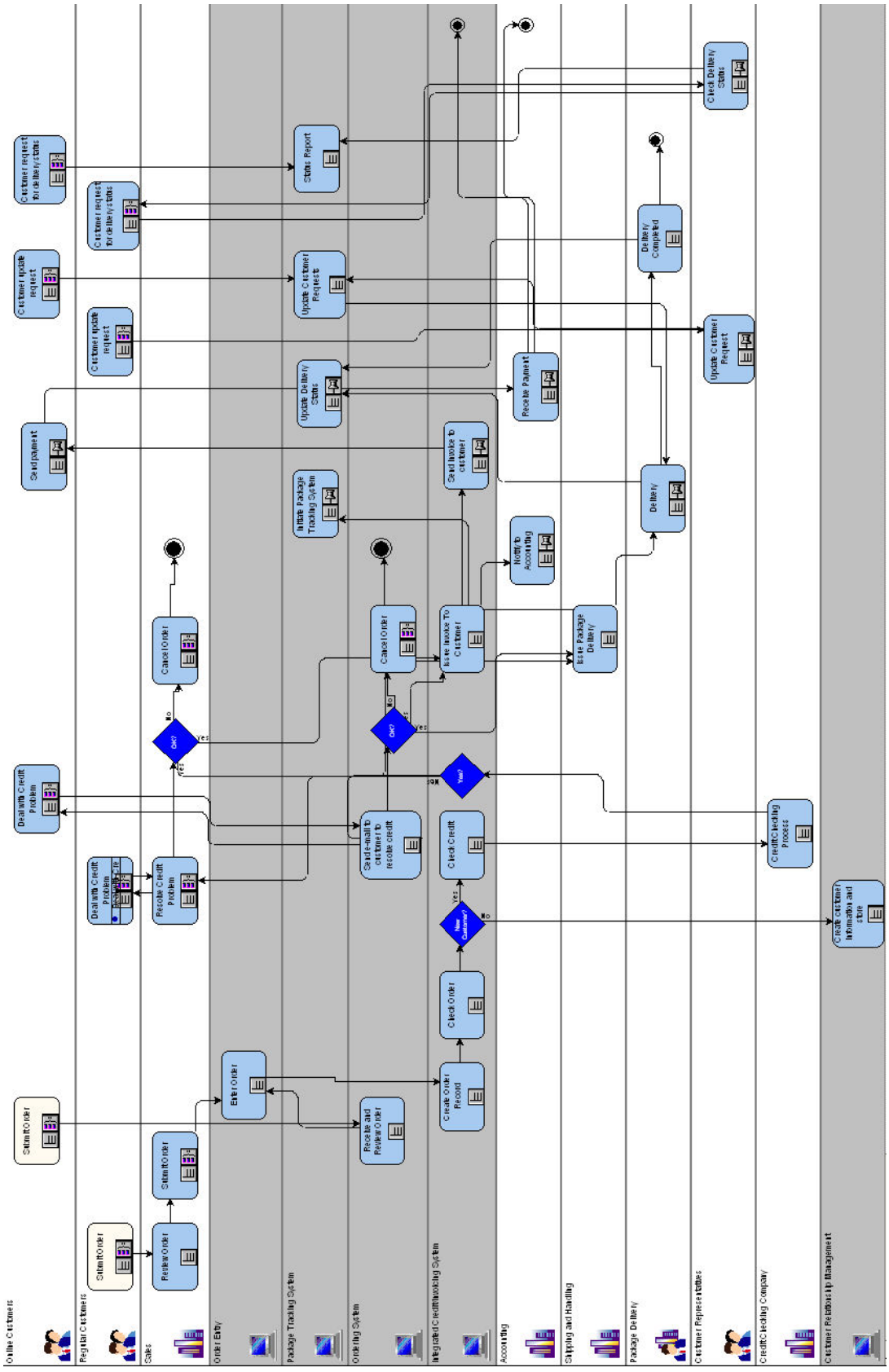

Exhibit 4 SHOULD Process Diagram for E-business Initiative

The organizational and IT principles relevant to the initiative were identified, and are given in Appendix 2, along with the models for each of the perspectives of the IT architecture framework. The models for the organizational perspective include the value chain system diagram (Exhibit 2), the process strategy matrix (Exhibit 3), and the SHOULD process diagram (Exhibit 4).

Perspectives	Principles	Models
Infrastructure	Interoperability, Scalability, Accessibility, Portability, Adaptability, Reusability, Compatibility, Usability.	Logical & Physical IT architecture models Supporting models.
Data	Access transparent to user Data captured at source Derivable data Timeliness	ER diagram Logical model - data perspective
Application	Scalability, Security, Ease of use, Stability Acquisition by outsourcing, Integration	System function table High-level use case Sequence diagram Activity flow diagram Layered application architecture Data Flow diagram where applicable
Organization	Mission Goals Objectives Initiatives	Value Chain System diagram Process Strategy matrix Process diagram Performance matrix

Appendix 2 Principles and Models for InterExpress IT Perspectives

A performance matrix based on the one illustrated in Table 2 was created for the e-business initiative, and is given in Appendix 3. The IT project is shown at the activity level of the matrix, and derives from the IT Strategic Plan shown on the process level. The enterprise Strategic Plan shown at the organizational level identifies the e-business initiative as of strategic importance to InterExpress Inc. This performance matrix shows alignment at each level, where the goals are managed in terms of the defined measures. It also shows alignment between each level, linking the E-business Project Plan to the IT Strategic plan, and in turn to the Enterprise Strategic Plan.

	Goals and measures	**Design and implementation**	**Management**
Organizational level	Strategy for E-business initiative is well articulated and communicated. E-business initiative will improve competitive advantage. Organizational goals include E-business System goals. Measures for the organizational goals are defined and communicated.	All relevant departments (accounting, shipping & handling, customer service) are value- chained and included in process architecture. Revise InterExpress Inc. formal organization to support the new strategy; to benefit from efficiencies of new e-business system. Develop Enterprise Strategic Plan to support new e-business system.	Plan, monitor, review and control execution of business strategy i.t.o. goals and measures of enterprise and E-business System.
Process Level	An IT strategic plan that supports enterprise strategy. Goals and objectives of E-business initiative is defined and linked to organizational level goals. Seamless communication through system integration. Measures for process goals are defined and communicated.	Adopt IT management process model Perform process analysis (model IS/COULD and SHOULD processes for E-business initiative based on value chain). Extend the logical requirements of E-business System based on feasibility report. Develop IT Life Cycle Processes (based on IEEE 12207) relevant to E-business System. Develop IT Strategic Plan.	Plan, monitor, review and control execution of IT strategy i.t.o. goals and measures. Align IT strategy with enterprise strategy. Manage IT Life Cycle Processes relevant to E-business System.
Activity or performance Level	IT project plan is aligned with IT strategy. All deliverables defined in IT project plan to be delivered in accordance with the E-business project charter. All the activity outputs and standards meet the requirements created for e-business system. Actors understand project charter, goals of E-business system. Standards, principles, performance measures are defined.	Adopt business process re-design process model. Develop IT Project Plan based on IEEE 1058. Develop WBS for order entry, sales, accounting, shipping & handling, and delivery activities reflected in system. Develop and assign project responsibilities for activities. Develop system specifications and design of E-business system (web-based online order/tracking). Implement E-business system.	Plan, monitor, review and control execution of E-business project i.t.o. goals and measures of project.

Appendix 3 Performance Matrix