Challenges for the Next Integration of E-Business Projects in Higher Education

Leonid B. Preiser

Department of Computer Science and Communications Technology
School of Engineering and Technology
National University
11255 North Torrey Pines Road, La Jolla, CA 92037-1011
(858) 642-8483, fax (858) 642-8489
lpreiser@nu.edu

Introduction

The reality of E-Business proliferation is posing new challenges as companies and businesses around the world are increasingly struggling to manage and track respective projects. Recent growth in global utilization of Internet technologies has posed several questions and brought new opportunities to the academic and research community.

This paper focuses on methodologies and criteria intended to integrate unique E-Business features into the project infrastructure concept (PIC) applicable to the respective graduate and postgraduate curricula. Those unique E-Business features factored into the discussed PIC include variable-term dynamics, uncertainty in trends, critical dependence on environmental interacting components, constraints on linkages, unpredictable technological advances, and relatively short life cycles of telecommunications protocols.

The PIC architecture includes sequence of four interacting project layers (IPL) - business layer, applications layer, networking layer, and engineering/technology layer – so that analysis at each upper layer would produce requirements that are passed down to lower layers, whereas solutions meeting these requirements are passed back to the upper layers. Each IPL is decomposed into the series of project knowledge areas (PKA). This paper discusses selection process, purpose and use of applicable project knowledge areas, so that for each IPL, a respective set of PKA would be structured in a way to accommodate essential attributes of E-Business features. For example, a set of five PKAs for business project layer - strategic business planning, identifying major business functions, justifying business processes, selecting business opportunities, and augmenting process reengineering - would be linked with environmental interacting components, such as International Standards Organization, International Telecommunications Union, telecommunications carriers, regulatory agencies, vendors, manufacturers, business customers, and legislative bodies. In a similar way, the PKA set for the networking project layer utilizes the

Open Systems Interconnection model commonly accepted in the applied data communications industry.

Traditional Project Management Model

The traditional Project Management (PM) model developed by the Project Management Institute in their recent document PMBOK® Guide 2000[1], maps the nine PM knowledge areas into the five PM process groups of initiating, planning, executing, controlling, and closing, as depicted in Fig.1.

Project Management Knowledge Areas	Initiating Process	Planning Process	Controlling Process	Executing Process	Closing] Process
Project Integration Management					
Project Scope Management					
Project Time Management					
Project Cost Management					
Project Quality Management					
Project HR Management					
Project Communications Management					
Project Risk Management					
Project Procurement Management					

Fig.1 Traditional PM Processes and Knowledge Areas

Proposed E-Business Project Infrastructure Concept

Transformation from E-Commerce business model of B2C (business-to-customer) to the expanded E-Business concepts of B2B (business-to-business), G2B (government-to-business),

G2C (government-to-customer), and C2C (customer-to-customer) has created new challenges in adapting traditional project management logistics within the educational marketplace to the emerging E-Business paradigm.

Similar to the PMI's model[1], the proposed Project Infrastructure Concept (PIC) introduces a sequence of four Interacting Project Layers (IPL) - business layer, applications layer, networking layer, and engineering/technology layer. The major advantage of this approach derives from the fact that traditional PM life cycle of proceeding from the current PM process to the next PM process ("sequential engineering") is transformed into the concept of highly interactive IPL layers thus replacing the traditional life cycle with "concurrent engineering" concept.

Why Concurrent Engineering Concept?

Unlike the traditional business projects, E-Business unique features, such as variable-term dynamics, uncertainty in trends, critical dependence on environmental interacting components, constraints on linkages, and unpredictable technological advances, to name a few, require more integration in knowledge areas, processes, and time dynamics. Furthermore, given the fact that project management must satisfy the needs of the corporation's stakeholders, such as stockholders, financial institutions (suppliers of capital), primary customers and suppliers, competitors, unions, government agencies, unions, company employees, managers, executive officers, or boards of directors, it seems reasonable to suggest that implementation of the concurrent engineering approach embedded into the PIC model would maximize flexibility, manageability, value and price/performance of E-Business projects.

Thus, concurrent engineering integration of the project management knowledge areas, processes and time dynamics would be expected to result in maximization of price/performance value for E-Business.

PIC Model

Proposed PIC model integrates four major principles:

- Analysis at each upper Interacting Project Layer would produce requirements that are passed down to lower IPLs, whereas solutions meeting these requirements would be passed back to the upper IPLs (Fig. 2).
- Each IPL is decomposed into the series of Project Knowledge Areas (Fig. 3).
- Within the given PKA group, each PKA would be decomposed into the "visioning process" sequence which includes the following elements: scope, process characteristics, measurable objectives, critical success factors, and risks/limitations (Fig. 4).
- Within the given PKA group, each individual PKA would be modeled by representing them as "input-tools and techniques-output" diagrams wherein the input to the next PKA would be the output from the previous one within the given PKA group (Fig. 5).

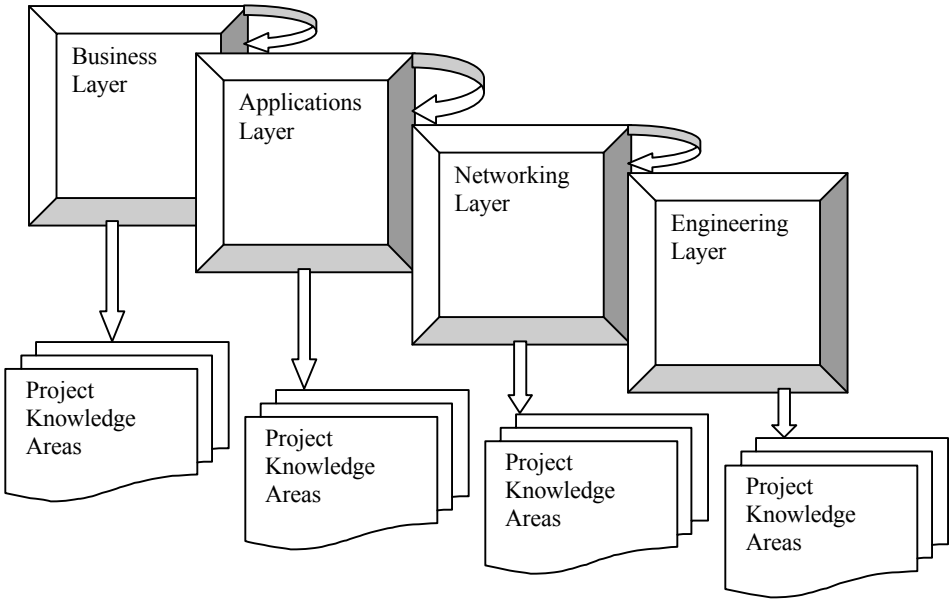

Fig. 2 E-Business Project Infrastructure Concept

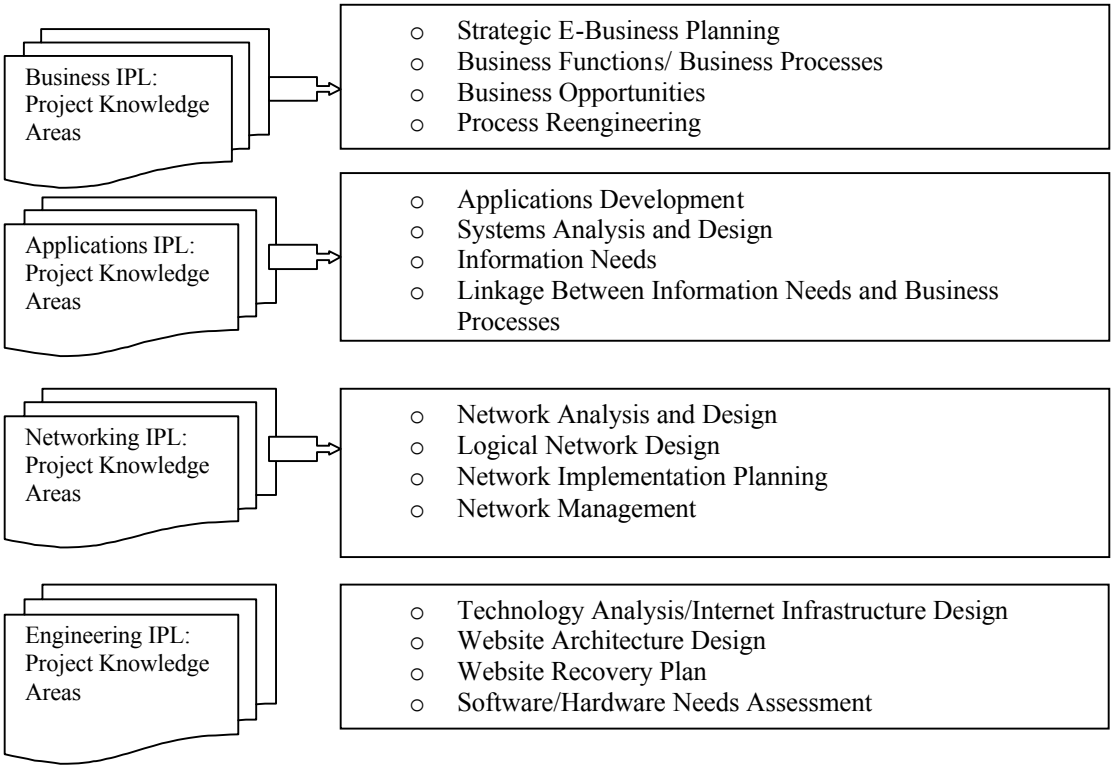

Fig. 3 Decomposition of the Interacting Project Layers into the Sets of Project Knowledge Areas

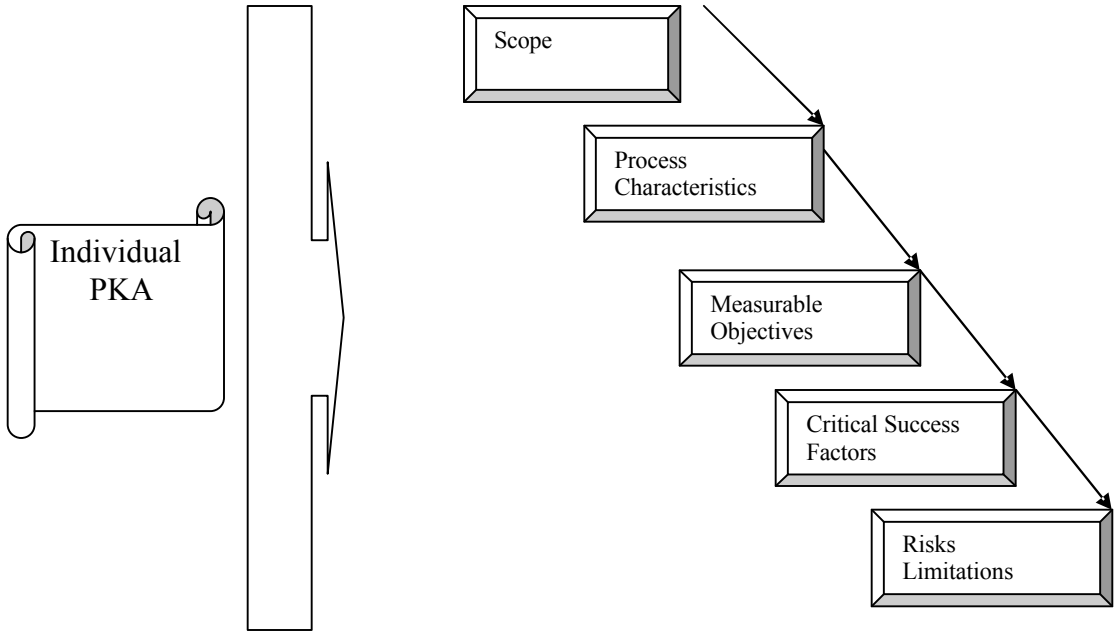

Fig. 4 Decomposition of an Individual PKA into the "Visioning Process" Sequence

Dynamics of PIC Processing for E-Business Projects

In order to establish a flowchart of processing the proposed PIC model for E-Business projects, the following principles should be implemented, as it is conceptualized in Fig. 6:

- The main processing flow would sequentially move from IPL to IPL starting with IPL # 1.
- Within each IPL, the "visioning process" would be initiated from the first PKA assigned to the respective IPL's PKA group.
- The process then will proceed with "input-output" sequence between consecutive PKAs assigned to the particular IPL.

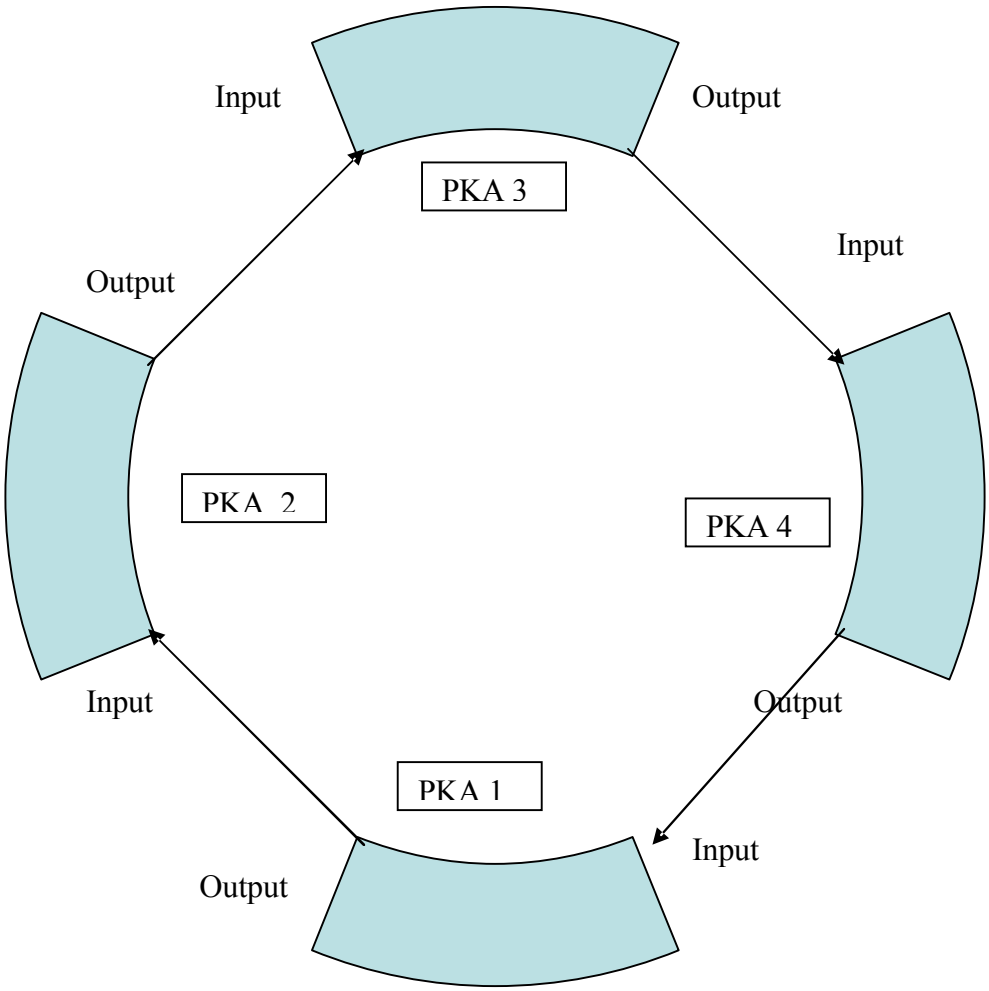

Fig. 5 Input-Output Diagram within Each PKA Group

Extension of PIC Model to the M-Business Projects

Implementation of emerging wireless solutions and utilization of their benefits on restructuring many traditional EB startups during the last several years has led to extension of the discussed PIC model toward applications dealing with Mobile Business (M-Business) projects. It is expected that by 2003, more than half of all Internet access will be wireless, and the number of people using wireless Web will reach over 200 million by 2005.

As an example of such an extension, the M-Education Project addressing the issue of enhancement of educational access and academic quality in traditional university environment through implementation of emerging wireless technologies is examined. Proposed M-Education Model[2] represents a new paradigm whereby students enrolled in the traditional classroom setting

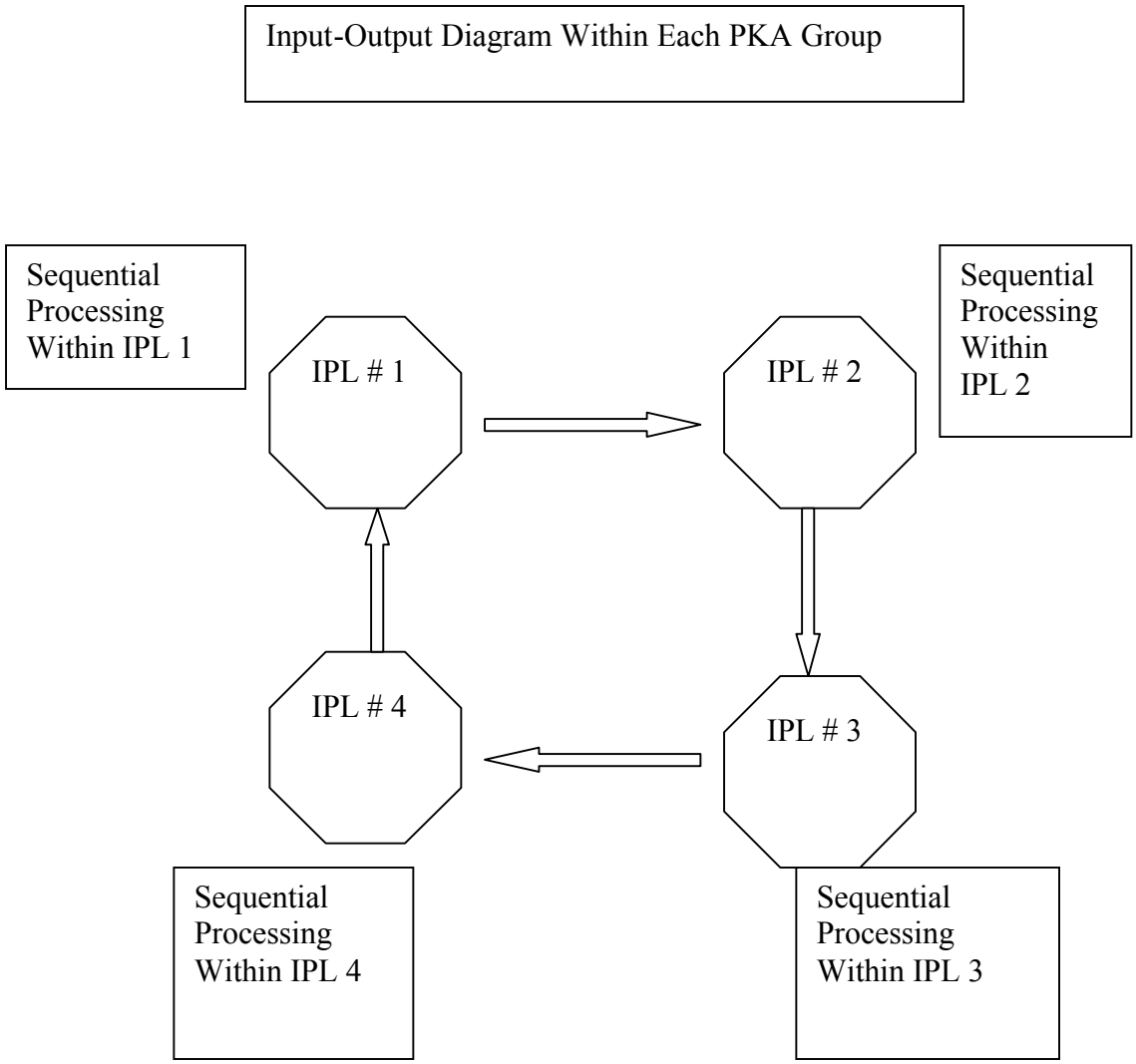

Fig. 6 Dynamics of PIC Processing

(as opposed to an online mode) would greatly benefit from an added wireless solutions infrastructure allowing them to perform many academic transactions at any time and from many places - seamlessly, interactively, and efficiently.

Adjustments for the Project Knowledge Areas applied to the projects with mobile applications (M-Business Projects) could be broken into the following categories:

- Different kinds of device technologies, such as Internet-enabled desktops, personal digital assistants (PDAs), WAP phones (smart phones with wireless Web access will outnumber PDAs by 60:1 before the year 2005), and different devices supporting multiple kinds of browsers.

- Network protocols with different parameters, such as voice, data, messaging supporting traffic from real-time conversations to one-way messaging, WAP, GSM, CDMA, and TDMA.

To customize the PIC Model through adjustments affecting the Project Knowledge Areas, the following categories of design factors are considered:

- Design factors for hardware: presentation factor, information factor, computational factor.
- Design factors for networks: coverage factor, performance factor, security factor.
- Design factors for interaction: continuity factor, duration factor, multitasking capabilities factor.

Validation of the Proposed Model

This research is based on the project management methodologies applied to the E-Business projects at the Department of Technology and Information Systems, La Jolla, CA-based National University through coordination and analysis of more than fifty capstone Master's Research projects in E-Business.

All the projects have been divided into the four major categories lining up with four respective Interacting Project Layers: Business IPL, Applications IPL, Networking IPL, and Engineering IPL. It should be noted that, in general, any E-Business project would include elements from all IPL domains; however, within each of those major categories their respective features would dominate the project scope in comparison with the ones from three other IPLs.

For each category of E-Business projects, validation assessment included: a) proposed project-specific outcomes, b) proposed measurable objectives, c) proposed benchmarks for determining project success, d) proposed evaluation methodology, e) supporting database, and f) decisions based on the results of assessment and their targeted implementation.

Major results for a variety of the projects with topics ranging from the global online enterprise developments to E-Business Process Reengineering involving small-to-midsize domestic companies indicate good correlation with the proposed model. This model is still open to modifications and adjustments: for example, it has been found that the "visioning process" sequence within each individual PKA, per Fig.4, should be supplemented with additional elements such as delimitations and assumptions. Also, for all major IPLs, backup recovery implementations should be included as part of the design process.

Bibliography

1. Project Management Body of Knowledge (PMBOK® Guide) 2000. Newton Square, PA: Project Management Institute.

2. Leonid Preiser, “Emerging M-Education Model Utilizing Wireless Internet Technologies”. Proceedings of the 2002 ASEE Annual Conference. S. 2558. June 16-19, 2002.Montreal, Canada.

LEONID B. PREISER
Ph.D. in Electrical Engineering, Senior IEEE member, ASEE member. Since July 2002, Professor and Chair, Department of Computer Science and Communications Technology, National University (NU), La Jolla, CA. 1999-2002: Professor and Chair, Department of Technology and Information Systems, NU. 1997-1999: Director of the Center for Technology, NU. 1995-1997: Dean, School of Engineering and Computer Science, West Coast University, Los Angeles. 1979-1994: research engineer and consultant, Andrew Corporation, Orland Park, IL.