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IN PAST ISSUES OF *DECISION LINE*, the ecommerce column has examined many applications of ecommerce and information technology. In this issue, however, we turn our attention to ecommerce education. This serves as a reminder of the Decision Science Institute's mission and its dedication "to advancing knowledge and improving instruction in all business and related disciplines." This month's article by Shim and Simkin explores the current state of ecommerce and ebusiness education in colleges and universities around the globe. They conclude that universities can and do support ecommerce in a number of ways—through programs in ecommerce, partnering with businesses, and by conducting important ecommerce research. Remember to visit the DSI Web site containing the list of pioneering universities that are currently offering ecommerce programs.

The Roles of Universities in Ecommerce and Ebusiness Growth and Expansion

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By almost any measure, business uses of the Internet are growing. In retail sales, for example, the U.S. Department of Commerce estimates that quarterly ecommerce in the United States grew from \$5.4 billion in the fourth quarter of 1999 to \$17.2 billion in the fourth quarter of 2003—an increase of over 200 percent during that period (Scheleur & King, 2004). Ecommerce sales are also growing as a percent of total sales. [Note: Quarterly ecommerce is defined as sales of goods, services, gift certificates, and commissions (only) from electronic auctions, where an order is placed by the buyer or price and terms of sale are negotiated over the Internet, an extranet, EDI network, e-mail, or other online system; sales made to a customer in a foreign country through a U.S. Web site are included in the estimates; statistics are based on a quarterly survey of 11,000 U.S. companies.]

It is not surprising that the Internet is also changing the way companies conduct their business and interact with customers. Through ecommerce,

the Internet enhances product values, increases competitive advantages, helps corporations communicate with buyers and investors through Web pages devoted to product information and corporate news, and enables firms to manage customer relationships better. For many businesses, the Internet also provides access to new markets, strengthens existing supply-chain relationships, enables smaller companies to compete better with larger ones, and helps build corporate values (Melymuka, 2003; Kalakota, 2001). Similarly, some experts believe that intrabusiness uses of the Internet are among the most important consequences of online capabilities (Melymuka, 2003).

In this article, we examine how universities are responding to these ecommerce and ebusiness trends. For example, does it continue to make sense for educational institutions to offer classes in ecommerce? Or, is university-led research waning because ebusiness methodologies and techniques are so well understood? To answer these and related questions, the authors looked at

three areas in which universities can continue to play important roles in ebusiness growth and expansion: education, outreach (partnering), and research.

Education

In addition to their primary business of educating students, universities are themselves large-scale ebusiness users. They post online university course and schedule information, perform student-registration tasks, provide online intake forms for financial aid and scholarships, distribute individual class and grade information, support class bulletin board applications, procure office supplies, email, and even sell tickets to campus functions (Levinson, 2002). A growing number of instructors also use the Internet to create, administer, grade, and record examinations online.

Many universities also offer classes that teach students about ecommerce. Institutions not only teach undergraduate and graduate students about ebusiness theories and techniques, they also offer learning workshops and seminars to corporate employees and executives. Examples of ecommerce classes include Internet marketing, advertising, and entrepreneurship; Website design, implementation, and maintenance; both client and server-side programming and management; videoconferencing technology; telecommunications and networking strategies; international commerce; strategic management of Internet resources; and various ecommerce-related economics and information systems classes (Mitchell & Strauss, 2001).

Institutional fears that student interest in ecommerce education would die with the demise of the dot-com craze itself are amply repudiated by the continued growth of ecommerce and ebusiness course offerings. In data published in 2001, it was difficult to find a four-year college or university that did not offer some type of ecommerce course. Alsop [2001] found that fully one-quarter of the 282 schools responding to its survey instrument offered ecommerce or ebusiness concentrations

in MBA programs and concluded that "ecommerce is very much alive and well." Deakin [2001] found that ebusiness was a "big major on campus," and that graduate programs were "popping up like mushrooms." Boland [2001] concluded that, despite the nation's dot-com experiences, business schools were "failing to provide graduates with adequate ecommerce experience."

Because it takes time for universities to drop class offerings from their catalogs, it may be argued that a long-run negative trend still exists. However, we found evidence for just the opposite conclusion. In our survey of AACSB and certified ecommerce vendors, we discovered degrees, certificates, and center/institutes being offered at 208 universities in ebusiness or ecommerce as of April 2004. Table 1, available at www.decisionsciences.org/DecisionLine/Vol35/35_4/35_4ecom-tab1.pdf, shows that 72 universities in North America now offer undergraduate bachelor's degrees or certificate programs in ecommerce or ebusiness. In updating this table from data reported by Shim [2001], we found 37 additional schools that offered undergraduate degrees or certificates in ecommerce or ebusiness in 2004.

Ecommerce applications cover an enormous range of settings, so it is not surprising that the range of courses is also quite diverse. At the University of Notre Dame, for example, a semester-long class covers ebusiness applications used by a remarkably old industry—the railroads. Course topics included such tasks as assigning freight cars to specific trains, scheduling track usage, creating crew schedules, tracing shipments, timing deliveries, and remixing everything when customers change their Internet orders (Hums, 2002). Of special interest . . . this class was Web-based.

Reasons why students take undergraduate ecommerce classes vary widely [Deakins, 2001]. Some simply want to learn how to build and maintain their own Web sites. Others want to develop or enhance Internet skills, learn about new ecommerce methodolo-

gies, or save the costs of contracting outside consultants to perform vital ebusiness tasks. For yet others, they are motivated to enroll by a need for re-trenchment in the aftermath of dot-com failures and the desire to align themselves with proven technologies.

As one might expect, ebusiness instruction is not limited to undergraduate education. For example, we found that at least 87 AACSB-accredited universities now offer master's concentrations in ecommerce or ebusiness, and that another 47 institutions offer full-fledged master's degrees in this area as of April 2004 (Table 2). Table 2, available at www.decisionsciences.org/DecisionLine/Vol35/35_4/35_4ecom-tab2.pdf, shows that more schools offer concentrations than degrees in ecommerce or ebusiness, probably reflecting the fact that many of the programs offered in colleges of business are general-MBA degrees instead of MS-specialty degrees. It is also important to recognize that these figures probably underestimate the total number of available ecommerce programs and degrees because many non-AACSB institutions also offer them.

Of course, not all ebusiness programs are successful—some fail [Rob, 2003]. A few schools are quietly changing the titles, if not direction, of their Internet-related course offerings; for example, titles containing the phrase "ecommerce" or "net-enhancement" have turned into "ebusiness" [Alsop, 2001; Straub, 2004]. Nonetheless, the unmistakable trend in academia is continuing support for ecommerce/ebusiness courses and programs.

Partnering

Most companies recognize the need to address the business issues and strategies of the ebusiness economy. (See, for example, the IBM Institute for Advanced Commerce reference. Companies such as Cisco, HP, Dell, Amazon, and eBay also do very well along these lines.) "Profitability" is certainly one concern. Fomin, et. al. [2003] note that only "25 percent of all public net companies in

Vision Fund Projects (samples from numerous projects)

- Platform Technologies and Leadership Strategies in the Internet Economy
- Design and Delivery of Online Promotions
- eBusiness Political Strategies in Internet IP Protection
- Trust and Reliability in eCommerce
- Costs and Benefits of Web-based Recruiting and Hiring
- Automatically Discovering, Selecting, and Combining Web Services Using Business Process Descriptions
- Globalization of eBusiness: New Markets and New Services
- Coordination and Risk Sharing Across Multiple Tiers of Supply Chains
- Impact of Information Technologies on Product Customization
- Attribute-Based Securities Trading of Concepts (STOC)
- Internal Equity, Complementarity and Influence Cost
- Understanding the Roles of Technology in Improvising at an eBusiness Startup
- Combinatorial Auction Design
- Role of Online Conversations in Brand Identity
- Combinatorial Auction Design: Algorithms and Economics
- Incentives for Eliciting Preferences and Recommendations on the Web
- New Approach for Data Mining and Clustering in eBusiness
- e-Talent Market Places as a Mainstream Business Tool
- Contract Communications in XML Agent Marketplaces
- Impact of New Economy Employment Relationships on Individual and Corporate Performance
- Dynamic Management Problems in eBusiness
- Dynamic Pricing to Improve Supply Chain Performance
- Marketing Survey by WebMarkets
- Building Robust Online Reputation Reporting Systems
- Electronic Price Setting Mechanisms in Online Auctions

Research Support

A third way that universities assist ecommerce is by supporting research on new ways of performing ecommerce. Although industry is probably ahead of academia in the experimental uses of the Internet for ebusiness (Bolan, 2001), it is still an active research participant. [Many of the reference citations at the end of this paper testify to the continuing interest in ecommerce as an avenue of research inquiry by academics (Corbitt, et al., 2003; Koh, et al. 2003; Shankar, et al., 2003; Tan, 2003).]

In our investigations, we were surprised at the many ways in which universities foster research on Internet subjects beyond their traditional support of academic research in general. For example, academics publish relevant information in new journals. In 1999, for example, the Wharton Business School at the University of Pennsylvania started an electronic business journal entitled *Knowledge@Wharton* that discusses various aspects of modern business, including features on managing technology and electronic marketing (see knowledge.wharton.upenn.edu). Another example is sponsoring ecommerce conferences, which disseminate information and ideas about ecommerce and also allow participants to network with one another and trade ideas (Leary, 2002). One of the most important conferences in this area is the annual Bled eCommerce Conference in Bled, Slovenia, which is sponsored in part by the University of Maribor (Republic of Slovenia).

Yet a third way in which universities support ecommerce research is by partnering with businesses on research projects. Examples of such direct-partnering include a project on consumer behavior within online environments sponsored by eBay at Vanderbilt University (Elab at the Owen Graduate School of Management, 2002); a project on customer retention at Dell computers through data mining sponsored by Dell Computer Corp at MIT (Center for eBusiness, 2001); and a project on B2B e-Procurement with mul-

Table 3: A sample list of funded projects (adapted from Center for eBusiness @MIT).

ebusiness are profitable." Another concern is "need to match competition." These concerns suggest that an important way for universities to foster the growth and expansion of ebusiness is by developing partnerships with interested companies and performing funded research projects.

Table 3 provides selected examples of such projects (e.g., vision fund projects and company-funded projects) underwritten by the Center for eBusiness at MIT. Through grants funded by corporate sponsors, this center awards more than \$3 million annually to ebusiness researchers. A stipulation for these grants is that the research be new work that would otherwise not be funded (Center for eBusiness, 2001). In this way, MIT nur-

tures ebusiness expansion into new and otherwise possibly neglected areas.

Another example is the ePartners program at North Carolina State University. The program maintains an interactive resume bank for industry recruiters, providing access to IT faculty for collaborative activities, fostering student participation in projects and events, and encouraging industry input on curriculum matters (ePartners, 2001). Partners in this program include AT&T, Kodak, IBM, Cisco Systems, and BlueCross BlueShield of North Carolina. Through partnerships, universities are keeping ebusiness opportunities visible and often more accessible to corporations through the promotion of growth opportunities.

Company Funded Projects (samples from numerous projects)	
BT	<ul style="list-style-type: none"> • eBusiness Process Handbook and the Matrix of Change
Dell	<ul style="list-style-type: none"> • Customer Retention Using Data Mining
Hewlett-Packard	<ul style="list-style-type: none"> • Using the Internet for B2B eCommerce for SMEs • Support Services That Enable 'Always On' Infrastructures • Two-Tier Support Business Models • Pricing Products and Services in the High-Tech Industry
Intel	<ul style="list-style-type: none"> • Building an Internet Trust Generator • eBusiness Process Handbook: Linking to Supply Chain Visualization
Fleet Financial	<ul style="list-style-type: none"> • Price Competition and Margins • The Value of Aggregation
UPS	<ul style="list-style-type: none"> • Using the Internet for B2B and B2C eCommerce • Implications of ecommerce for New Services and Structure of Logistics Systems
Suruga Bank	<ul style="list-style-type: none"> • The Impact of the Internet on the Future of the Financial Services Industry
PricewaterhouseCooper	<ul style="list-style-type: none"> • Information Transparency and Value Reporting
MasterCard International	<ul style="list-style-type: none"> • Wireless and Mobile Commerce Opportunities for Payments Services • Design and Test of a User Innovation Toolkit for MasterCard International • Payment Method Design: Psychological and Economic Aspects of Payments • Getting Something for Nothing (maybe): The Case of Probabilistic Purchases
General Motors	<ul style="list-style-type: none"> • Listening In: Creating a Virtual Engineer to Identify Design Opportunities by Monitoring Internet Exchanges Between Buyers and a Virtual Buying Consultant
CSK	<ul style="list-style-type: none"> • The Virtual Customer
Cisco	<ul style="list-style-type: none"> • Internet Organization: Documenting and Measuring the Business Process of Technology Leaders and the Creation of Intangible Assets
Merrill Lynch	<ul style="list-style-type: none"> • The Integrated Global Digital Financial Factory of the Future/Focus On Integrating Financial Information • Project Supernova • Artificial Markets, Electronic Market Maker and Adaptive Agents
Neptune Technologies	<ul style="list-style-type: none"> • Advisors in Online Investing
Visteon	<ul style="list-style-type: none"> • Towards a Design Handbook for Designing Robust, Efficient B2B Marketplaces • The Strategic Use of Reverse Auctions in the Supply Chain
IPG/McCann-Erickson/Weber	<ul style="list-style-type: none"> • Building Trust on Web Sites: Identifying and Understanding the Importance of Site Cues
Zefer	<ul style="list-style-type: none"> • Venturing in Wireless: Mobile Commerce and Wireless Data
Unilever	<ul style="list-style-type: none"> • A Data Mining Approach for Identifying the Most Valuable Consumers
Nortel	<ul style="list-style-type: none"> • Seeing Ahead: Forecasting New Wireless Markets

Source: <http://ebusiness.mit.edu>

Table 3: (continued).

multiple corporate sponsors at the University of California, Berkeley (Fisher School for Information Technology and Marketplace Transformation, 2002).

Yet a fourth way that universities help support research on ecommerce is by creating adjunct ebusiness centers or institutes. The exact types and missions of these institutions vary considerably. For example, the Center for e-Business at MIT has three major activities: (1) a large-scale research agenda funded by various industries, (2) an MBA ecommerce track, and (3) an ebusiness executive education program (Center for E-Business, 2001).

University research centers are not limited to the U.S. A current list of such centers is shown at ecom.fov.uni-mb.si/ecomENG/Links/links-esearchCenters.htm (2003).

Research centers or institutes enable their participants to interact with industrial clients or benefactors in an objective, industry-wide climate, pursue broad ebusiness inquiries of interest to a broad spectrum of providers or consumers, and focus on timely ecommerce issues that warrant serious and professional investigation (see Table 4). In the opinion of the authors, university research centers have the following special advantages in performing research in ecommerce and ebusiness.

1. The ability to use and apply professional research standards when investigating Internet-related business practices and theories.
2. They can perform such investigations in established facilities and with trained staff and well-understood statistical methods and procedures.
3. The inherent objectivity and resultant credibility that derives from such efforts.
4. The natural synergies and economies of scale that accrue from a research center that focuses on specific tasks, in this case, conducting research about ecommerce.

1. **Single Client with Single Benefactor:** This model involves engaging an organization in what is a proprietary research interest in which the funding organization is the primary benefactor of the research (e.g., company funded projects of Center for eBusiness@MIT).
2. **Single Client with Multiple Benefactors:** This model is typically found in universities located within mid-size metropolitan areas and a few, but significant, corporate headquarters (i.e., insufficient corporate headquarters to create a high powered multi-client research program using local companies).
3. **Multi-Client with Multiple Benefactors:** This model involves engaging numerous organizations to share the funding expense of the research center and/or institute. This model is used by the Center for Information Systems Research at MIT and/or the Center for eBusiness@MIT.

Table 4: Three basic models for research centers in terms of client and benefactor (adapted from James C. Wetherbe's CAIS article, vol. 7, no. 7, 2001).

Summary and Conclusions

Our study of university-Internet relationships described three major ways in which universities can and do foster e-business: (1) education, (2) partnering, and (3) research support. We found that universities are increasing both their own uses of the Internet and offering a wider variety of courses and programs about e-commerce and e-business. Partnerships between industries and universities involve students, instructors, ebusinesses, and corporate executives. Schools benefit from research grants; professors gain access to data in the fast-paced world of e-commerce; students gain learning experiences; and industry sponsors benefit from the research power of universities and the availability of training in e-commerce.

Finally, we found that universities are especially active in supporting research about e-commerce. Avenues include traditional encouragement for scholarly faculty inquiry about important commercial enterprise as well as publishing new journals that report scholarly findings about e-business. Support includes partnering with businesses and industries on research projects and creating and maintaining complete e-commerce centers and institutes, many of which have a multitude of teaching, partnering, and research missions. Because of their traditional role as independent research institutions and for a variety of additional rea-

sons stated in the paper, we feel that e-commerce and e-business research is especially appropriate and advantageous in university settings.

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International Journal of Internet and Enterprise Management (IJIEEM) seeks papers for a special issue (v4 n2, Spring 2006) on "Supply Chain Management in the Information Age." Submission deadline is February 28, 2005. Guest editors are G. Keong Leong, keong.leong@ccmail.nevada.edu; and Keah-Choon Tan, kctan@unlv.nevada.edu.

Production and Operations Management Journal seeks papers (theoretical as well as empirical) for a special issue on "E-Auctions for Procurement Operations." Submission deadline is March 31, 2005. Special issue editor is Richard Steinberg, r.steinberg@jims.cam.ac.uk; co-editor is Martin Bichler, martin.bichler@in.tum.de.

Journal of Operations Management seeks papers for a special issue on Supply Chain Management in a Sustainable Environment. Submission deadline is April 15, 2005. Guest Editors are Vaidy Jayaraman, vaidy@miami.edu; and Jonathan Linton, linton@rpi.edu.

Journal of Operations Management seeks papers for a special issue on Incorporating Behavioral Theory in OM Empirical Models. Submission deadline is April 15, 2005. Guest Editors are Elliot Bendoly, elliot_bendoly@bus.emory.edu; and Ken Schultz, keschult@indiana.edu. <http://aom2.pace.edu/om/>

International Journal of Production Economics seeks articles for a special issue on "Organizational Structure, Culture and Operations Management: An Empirical Missing Link." Submission deadline is June 30, 2005. Special Issue Editors are T.C. Edwin Cheng, lgtcheng@polyu.edu.hk; and Kee-hung Lai, lgtmlai@polyu.edu.hk; North and South America, Europe Regions: Xenophon Koufteros, kouftero@fau.edu; Chris McDermott, mcderc@rpi.edu.

International Journal of Web Services Research (JWSR) is a high-quality refereed journal on Web services research and engineering that serves as an outlet for individuals in the field to publish their research as well as interested readers. As a research and engineering journal, the *International Journal of Web Services Research* will facilitate communication and networking among Web services/e-Business researchers and engineers in a period where considerable changes are taking place in Web services technologies innovation, and stimulate production of high-quality Web services solutions and architectures. The editor-in-chief is Liang-Jie (LJ) Zhang, IBM T.J. Watson Research Center, USA. The inaugural issue was published in January-March 2004. Assistant Editor-in-Chief: Patrick C. K. Hung, cshckATcs.ust.hk.

International Journal of Business Process Integration and Management (IJBPIM) seeks papers on the emerging business process modelling, simulation, integration and management using emerging technologies. Editor-in-Chief is Liang-Jie (LJ) Zhang, IBM T.J. Watson Research Center, USA. Contact Assistant Editor-in-Chief Patrick C. K. Hung, cshckATcs.ust.hk. <https://www.inderscience.com/browse/index.php?journalID=115>

Empirical Economics Letters (EEL) invites papers on all aspects of empirical economics. The editor in chief is Tariq S Islam. Contact Mohammad A. Wadud, Managing Editor, wadud68@yahoo.com.

Journal of Academy of Business and Economics (JABE) and *Journal of International Business and Economics* (JIBE) seek original research papers and articles (not currently under review or published in other publications). Contact Review@iabe.com. <http://www.iabe.com>

International Journal of Information Policy, Law, and Security (IJIPLS) seeks papers. Contact Managing Editor Shin-yi Peng, sypeng@mx.nthu.edu.tw; or eli@calpoly.edu. <http://www.inderscience.com/catalogue/i/ijipls/indexijipls.html> ■

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Web Links:

Table 1: Institutions offering bachelor's degree or certificate programs in ebusiness, www.decisionsciences.org/

[DecisionLine/Vol35/35_4/35_4ecomtab1.pdf](#)

Table 2: Institutions offering master's degrees or concentrations in ebusiness, www.decisionsciences.org/DecisionLine/Vol35/35_4/35_4ecomtab2.pdf

Knowledge@Wharton, an electronic business journal started by the Wharton Business School at the University of Pennsylvania, knowledge.wharton.upenn.edu

List of university research centers (not limited to the U.S.), ecom.fov.uni-mb.si/ecomENG/Links/links-esearchCenters.htm ■