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RETHINKING THE VIRTUAL UNIVERSITY

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ABSTRACT

This paper explores why the virtual university movement may be entering a new phase of development. This phase is characterized by inter-university coalitions that share information and communication technology (ICT) platforms to develop and deliver web-based courses. This collaborative movement is the result of a number of forces driven primarily by the need to address escalating ICT costs and overcome resistance of faculty to distance education initiatives. Complementary resources such as national library databases; Internet-based course materials; low cost, broadband communications; Internet2; and state legislative initiatives are additional drivers facilitating the move toward a collaborative virtual university (CVU) model.

This model is examined as a change agent for universities to reexamine their individual roles in leveraging Internet resources to enhance the quality of higher education programs. Leading edge initiatives are also described.

KEYWORDS: information and communication technology in higher education; virtual university; change management

I. HISTORY OF THE ROLE OF ICT IN HIGHER EDUCATION

Since the late 1950's, university managements invested continually in emerging technology infrastructure to maintain competitive resources for student and faculty, and to seek operating efficiencies through administrative applications.

While the dominant role of information and communication technology (ICT) in higher education continues to be in support of traditional administrative applications, a few institutions moved quickly in the early 1960's to experiments such as teaching the BASIC computer language to provide faculty and students with computer literacy and to demonstrate its potential for enhancing learning. By the mid-1970's many schools added some form of computer education as the opportunities for graduates with computer skills skyrocketed in the job market. This pattern of responding to "hands-on" training needs led to the proliferation of computer laboratories; support

staffs; and a never-ending need to upgrade IT infrastructure in concert with industry developments. The emergence of the PC in the early 1980's led to further infrastructure requirements. The explosion of the Internet in the early 1990's required additional upgrades to take advantage of the remarkable resources available on the World Wide Web.

Intense competition in the telecommunications industry led to economical broadband technology allowing voice, data, and video to be transmitted over a common channel. These communication resources are now the newest investment challenge for university ICT infrastructures since they provide an opportunity for more traditional "face-to-face" learning environment in formats such as "web-casting"[1]) that emulate the traditional synchronous classroom delivery mode.

In recent years, however, in addition to continual hardware and software spending, personnel costs for technologists to support these investments, particularly faculty support to develop web-based applications, have risen ever faster. [Green, 2002]. Yet, the National Survey of Information Technology in Higher Education reports that, despite escalating costs, less than a third of institutions reported a plan for financing information technology. [Losco and Fife, 2000]

II. ROOTS OF THE VIRTUAL UNIVERSITY MOVEMENT

The price of a college degree continues to grow above the average level of inflation. Since 1980, the dollar cost for tuition of all types of institutions doubled, increasing education costs for students faster than the cost of virtually all other consumer goods. [Losco and Fife, 2000].

A growing number of jobs require post-secondary education. Yet more and more students cannot afford these escalating tuitions. These forces led most universities to increase their investment in Internet technology as a potential solution by delivering course work on the Web. The U.S. Department of Education statistics report that over 54,000 on-line courses were being offered in 1998, with an anticipated growth rate of 20%. [Carnevale, 2000]. This new form of higher education, in which university courses are delivered on the Web, is generally described as a virtual university (VU) which provides students "anytime, anywhere" access to courses delivered on the Web.

Experience with this new medium shows, however, that in making these investment decisions universities failed to define objectives. Is the objective of the VU to reduce teaching costs? to increase revenue? to enhance learning? or to accomplish all three? In many institutions these policies were left undefined. [Hitt and Hartmann 2002]. More important, unlike historical applications of ICT in university programs, developing and delivering distance learning courses clashes with faculty perceptions of their role in the university.

As noted in Section I, VU initiatives come at a time in which traditional ICT infrastructure costs continue to mount. These costs generally occur in three-year cycles in response to continual technology and communications advances. The investments require upgrades for faculty and laboratory computers and increasing annual budgets for support staffs of knowledgeable personnel to support the expanding scope of applications. For example, a new cost is the move by many universities to provide "24x7" user access to support staffs. The experience with virtual university initiatives also disclosed a number of hidden costs. For example, administrative support and faculty release time needed for the development and delivery of on-line courses can incur significant cost. Yet identifying and allocating these costs is a complex task. Underestimating costs already shut down a number of major initiatives such as the NYU On-Line project. [Carnevale, 2000].

In response to state legislature inquiries, The Western Interstate Commission for Higher Education initiated a Technology Costing Methodology (TCM) Project to provide a tool for

[1] www.webex.com

analyzing educational technology costs[2]. This project is an attempt to standardize definitions of cost categories to legitimize cost comparisons. Tests of the TCM Handbook are ongoing in six universities and eighteen pilot sites [Johnstone and Poulin 2002].

III. VIRTUAL UNIVERSITY MODELS

Current VU models can generally be grouped into five categories, labeled A through E.

CATEGORY A: INTRA-UNIVERSITY INTERNET

This category refers to an intra-university Intranet using information and communication technology within the traditional bricks and mortar structure. Little or no distance learning initiatives are apparent. Category A schools provide Internet resources for a wide range of administrative applications; library access; and email, but are hesitant to expand their course offerings beyond the current student body. The extent of faculty use of new ICT tools in their own course delivery varies widely. This category primarily includes private institutions and is the predominant form of university usage of the Internet today.

CATEGORY B: ANYWHERE, ANYTIME

These universities provide an "anytime, anywhere" virtual classroom model using ICT platforms to deliver courses and degree programs for both resident and non-resident students. These initiatives[3] are growing rapidly. Most of the leading initiatives are evolutions of traditional "distance education" programs - historically known as correspondence courses - that now extend the university's delivery system to the Internet.

Some schools that never participated in distance education previously are now experimenting with redesigning traditional classroom courses for the Internet. Models representative of these Category B programs are described in Sidebar 1.

CATEGORY C: LEGISLATED AND COLLABORATED

This category includes state legislated and regional private virtual university collaboratives. These organizations complement and are supported by their member colleges, but do not develop or service courses. They act as centralized clearing-houses for course web-based course offerings offered by their member institutions.

State exemplars of this new trend include:

- Michigan (www.mivu.org),
- Illinois (www.ivc.illinois.edu), and
- Kentucky (www.kyvu.org)
- A directory of state programs can be found at http://oregonone.org/virtualU.htm

Private institution models are:

Associated Colleges of Central Kansas (www.acck.edu) ACCK is one of the oldest and most successful voluntary consortia in higher education providing administrative and distance learning resources to six members.

[2] www.wiche.edu/telecom/projects/tcm/index.htm
[3] www.campuscomputing.net

SIDEBAR 1
CATEGORY B VIRTUAL UNIVERSITY MODELS

PENN STATE'S WORLD CAMPUS (http://www.worldcampus.psu.edu)

Pennsylvania State University (PSU) is probably the most comprehensive model of how universities that made a historical commitment to extending their resources to non-resident students through distance education programs were able to migrate ICT platforms designed for distance learning into support for traditional classroom delivery. In 1992, PSU started a program to leverage their extensive experience into the mainstream campus curriculum. This effort led to the "World Campus" model in 1996. The implementation of World Campus also reflects the broad organizational changes required if a university is to implement a virtual university program and the long-term commitment required. [Ryan and Miller, 2000]

MARYLANDONLINE (www.marylandonline.edu**)**

Similar to Penn State's model. the University of Maryland has a long history of offering courses at distance locations from the main campus at College Park. MarylandOnline provides on-line courses in most college subjects leading to Associate, Bachelor, and Master's degrees.

THE STANFORD CENTER FOR PROFESSIONAL DEVELOPMENT
(http://scpd.stanford.edu/scpd/default.htm)

Stanford pioneered distance education for engineering professionals in the mid-1960's using closed circuit television. Their television system was adopted by other schools such as the University of Southern California and Southern Methodist University. Stanford continues to use new learning technologies today. Their program currently serves over 5000 students with many of their courses delivered on the Internet at no cost to the public.

The Southern Regional Education Board Educational Technology Cooperative (www.sreb.org/programs/EDTech/edtechindex.asp). SREB is a large-scale cooperative that includes 38 state higher education coordinating governing boards. It focuses on ways to help state leaders create and expand effective uses of technology in schools and colleges.

CATEGORY D: FOR PROFIT

This category consists of "for-profit" universities that compete with the traditional university. These models are typified by:

- Jones International University (www.jonesinternational.edu);
- Capella University (www.capellauniversity.com) and
- Cardean University (www.cardean.edu)

Some members of this category are now becoming accredited. While they still lack the "branding" of a traditional university, some traditional universities such as Cornell (www.ecornell.com) also perceive the "for-profit" model as an appropriate organizational form for these initiatives.

CATEGORY E: COLLABORATIVE VIRTUAL UNIVERSITIES

This category refers to inter-university academic technology initiatives formed to provide a common website for academic disciplines and related communities of interest. In many ways they emulate professional academic knowledge groups with a focus on common syllabi and shared content. These consortiums are explored in Sidebar 2.

SIDEBAR 2
INTER-UNIVERSITY ACADEMIC TECHNOLOGY INITIATIVES

Support from a series of grants from the Mellon Foundation[4] led to the formation of a number of consortia to gauge the costs and pedagogic effectiveness of using instructional technology in higher education. A leading edge model of this concept is the National Institute for Technology in Liberal Education. (www.nitle.org). NITLE works with three regional technology centers each composed of a large number of liberal arts institutions. These centers include:

- The Associated Colleges of the South (www.colleges.org/aboutacs.html);
- The Midwest Instructional Technology Center (www.nitle.org/midwest.php) and
- The Center for Educational Technology (www.nitle.org/northeast.php)

These new organizations are catalysts for web-based knowledge exchange among university faculties.

Usually one member of the consortium acts as a discipline-specific Web site for member institutions. A sample of shared course development hosted at Middlebury College can be viewed at www.nitle.org/arabworld.

Member schools can complement their current ICT infrastructure by subscribing to selected applications. This option provides a variable cost approach to adding on-line courses and minimizes faculty course development costs. For many small schools, this alternative could lead to total outsourcing of their ICT infrastructure, particularly their Web services. Distance learning's "anytime, anywhere" model led to the need for 24x7 availability and support. Centralizing this support structure provides significant efficiencies and shared overhead for this rapidly growing expense.

IV. BARRIERS TO CURRENT VIRTUAL UNIVERSITY MODELS

Despite the momentum and investment in these virtual university models Internet course delivery continues to conflict with the current nature of faculty work, inhibiting the full realization of the benefits of this new educational arrangement.

1. Faculty evaluations continue to be centered on published research. While faculty find the Internet invaluable in supporting their research efforts through communicating and exchanging documents with colleagues around the world, they move slowly to embrace ICT as a new teaching tool. Furthermore, the literature contains few empirical studies assessing the learning outcomes of teaching with ICT augmented delivery. [Alavi 1998, Morrissey 1998]. These studies show that instructional technology initiatives can be designed to enhance traditional learning models. Related support comes from scholars who provide detailed analyses of how traditional educational models can be translated to the ICT environment. [Leidner and Jarvenpaa 1995, Valcke 2001]. This scarcity of published research on the learning impact of ICT reflects, in great part, the faculty's lack of sense of urgency to develop courses that leverage this resource. Yet, university administrations continue to allocate a significant portion of their IT budgets to faculty support anticipating the utilization of the Internet for course delivery.

2. University faculty cannot move their classroom course to the web without significant rework. Reluctance to employ new Internet resources is increased by the complexity of course design. Rodenburg, [1999] provides a succinct summary of this challenge as

> *"… defining an instructional paradigm that is contextually appropriate and instructionally sound from this myriad of conceptual frameworks".*

[4] www.mellon.org/ceutt.html

3. Faculty compensation issues and ownership of ‘‘courseware” are barriers to course development. Faculty must make difficult trade-offs in allocating time between research and teaching to develop Web-based courses. Unlike the textbook model where faculty receive royalties, faculty may not be compensated for their Web-authored courses. In addition, the many different platforms adopted by universities inhibit the broad distribution of any course to other schools. [Passmore, 2000]

4. Faculty relationships inhibit use of instructional technologies. Developing and offering a “virtual” course independent of one’s colleagues may put pressure on others to follow suit to insure consistency in department curricula.

5. Responsibility for on-line course support is poorly defined. Students in a “virtual classroom” are believed to require more of the instructor’s time. Technology failures are known to occur. Faculty believe that such failures may reflect on their performance and the value of the course. In addition unlimited accessibility in this “anytime, anywhere” environment require faculty to be willing to adapt to a drastic change in their traditional work environment from their face-to-face classroom.

6. On-line courses still carry the connotation of a “correspondence” school. No doubt Category One universities are apprehensive about the impact on their reputation and, therefore, do not encourage faculty to embrace this new opportunity. However, broad-based distance education programs from leading schools such as Stanford and Penn State may slowly dilute this fear.

7. The perception of ICT as a productivity tool may conflict with faculty perceptions of their own value in society. The vision of a small, elite faculty serving thousands of students in a virtual delivery system is antithetical to faculty culture. It is also seen as an economic and intellectual threat. If a single faculty member can handle large groups of students, the number of faculty slots decrease and, over a relatively short time, the number of students undertaking PhD programs would decrease drastically.

8. The potential for reducing the number of faculty carries with it the unintended consequence that a new paradigm for funding research will need to be established. Since World War II, the enormous extent of the United States’ research activities resulted from the large number of faculty engaged in it. As the number of faculty is reduced, the extent of the research effort decreases. The country’s intellectual advantage could well disappear. The country would have to develop a new (and probably more expensive) arrangement to carry out its research.

Rice and Miller [2001] suggest that these divergent views of the virtual university may only be resolved through extensive participation by faculty in the universities’ technology planning. However, their study does not address a recommended form for such faculty participation.

These challenges are not without precedent. Misalignment of ICT strategy with organizational needs is a dominant theme in the information systems literature. [Weill,1998]. Reich and Benbasat [2000] identify the nature of this conflict as a failure for organizations to ensure “the ability of IT and business executives, *at a deep level*, to understand and be able to participate in the others’ key processes and to respect each other’s unique contribution and challenges.”

V. THE COLLABORATIVE VIRTUAL UNIVERSITY MODEL

Solutions to many of these challenges may be found in the concept of a collaborative virtual university (CVU) model. By extending the concepts of the inter-university initiatives described in Sidebar 2 many of the current barriers to implementing Internet based course work can be minimized. The CVU model enhances and broadens the learning institutions’ resources while benefiting from the economics of shared ICT costs. Its most important advantage is how it overcomes many of the faculty barriers. Sidebar 3 summarizes the benefits of the CVU concept.

SIDEBAR 3
SUMMARY OF THE CVU CONCEPT BENEFITS

1. Provides a technology platform for a "community of scholars"
2. Enables cooperative development of new course topics
3. Reduces member school ICT costs for technology upgrades and user support
4. Provides incentive for faculty to develop web-based courses
5. Lays groundwork for inter-CVU collaboration

OVERCOMING FACULTY BARRIERS

The focus of current virtual university resources on course delivery overlooks the value of the Web to provide a virtual community resource for faculty. Redirecting this focus to provide

"a *digital repository in which a community of users (educators) collaborate to share and evolve their knowledge in some domain or interest" [Bieber, et.al., 2002]*

would provide the foundation for more rapid and thorough course development by attracting faculty interested in this opportunity independent of their own institution's culture. Such discipline communities should also provide more robust course content. Faculty would find these communities valuable knowledge exchanges for their research encouraging the use and support of the CVU.

This independent CVU would have a number of the attributes of the traditional text publisher, the traditional model for faculty who pursue publishing opportunities. The CVU would provide their members' faculty an opportunity to "publish" web-based courses with the consortium acting as the publisher. This process would be independent of the author's own institution. These course royalties would provide the incentive and a source of faculty payment for their distance learning course development. Sidebar 4 shows alternative economic models for generating cash flow.

SIDEBAR 4
ALTERNATIVES OF ECONOMICS OF COURSE CREATION

At present, in many universities, the author of a distance learning course receives release time or extra compensation while the University retains the rights to the work and to all revenues. The payment is up front but the author receives no royalties even if the course is widely disseminated. In a VCU environment, alternate arrangements could be used. For example,

1. The author would behave like a freelance textbook writer.
2. The University treats web course development the same way that it treats textbook writing, offering no up-front payment.
3. The CVU would serve as publisher.
4. Students would be required to buy a "textbook" (guide to the web-based course perhaps in paper, perhaps on-line) .

4a. (Alternative) Course-adopting institutions would pay a fee to the CVU from money collected for course tuition.

5. The faculty member would receive a royalty based on the number of students who attend.
6. The surplus would go back to the consortium for redistribution.
7. Member institutions could "accredit' and accept for credit only those courses developed within the consortium or purchased by the consortium.

By delivering these courses on a common computer platform, course support can be centralized thereby reducing training costs; ensuring higher quality service; and lowering costs for member schools. CVU member schools could limit their investment risks by sharing the costs of implementing emerging technologies. The CVU management could also attract more expertise by offering opportunities to engage in large-scale, centralized research and manage pilot projects across a number of universities. A CVU would include more expertise in technology evaluation, thereby providing comprehensive and timely recommendations to the membership. This "clearing house" approach also alleviates the need for individual institutions to take on these continuing studies. The CVU could also bring buying power to member institutions in software, hardware and communications. The scale of the CVU would also attract Web-service vendors such as IBM and Collegis to bid on outsourcing Internet operations.

COORDINATING EXTERNAL RESOURCES

The CVU could be a coordinating mechanism to leverage the many resources described in Sidebar 5.

IMPLEMENTING THE CVU MODEL

The scale and scope of instituting a collaborative virtual university depends on a number of factors.

- Is there an existing body, such as the Association of Independent California Colleges and Universities (www.aiccu.edu), to act as catalyst for this model?
- Is there a member institution of such a body that will act as consortium manager and web site?
- Should the attributes of the consortium align with the nature of the university (e.g, liberal arts; business schools; small universities; state universities).
- Should the CVU outsource its own ICT infrastructure or build it cooperatively?
- How will a member university maintain its own identity in providing web-resources through the CVU?

An extensive treatment of the issues in university partnering can be found in Duin, Baer, and Starke-Meyerring [2001]

VI. CONCLUSIONS

The conflicts between the vision of ICT investments as a panacea for solving higher education's challenges, and those of their faculty, will require higher education administrators to recognize that productive faculty participation will require new organizational forms and planning processes to integrate ICT initiatives successfully.

The Collaborative Virtual University approach to managing this complex academic technology environment should provide university leadership with a valuable coordinating mechanism that takes advantage of the power of the Internet at a much lower cost while eliminating many of the barriers that inhibit faculty from employing technology in course delivery. Ultimately, the regional consortia that make up individual CVUs should lead to a national courseware library that approaches a pure university information utility. CVUs eventuality would allow universities the option to subscribe to selected information technology resources without the burden of managing their own ICT infrastructure. Above all, the CVU enhances the most important role of the university: the delivery of learning.

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SIDEBAR 5
VIRTUAL UNIVERSITY RESOURCE SITES

MIT'S OPENCOURSEWARE (http://ocw.mit.edu/index.html)

In April, 2001, MIT announced it would make MIT course materials used in teaching undergraduate and graduate subjects available on the web, free of charge, to any user, anywhere in the world. The first release of these materials appeared on October 1, 2002.. Over 40 courses representing a wide range of MIT's programs were made available as part of Phase I. Phase 2 will include a a major expansion of course offerings

DIGITAL LIBRARIES INITIATIVE (www.dli2.nsf.gov)

Phase 2 of this initiative was launched in 1998 by NSF to fund continuing research in enhancing digital library delivery systems. A new program, started in 2002, is intended "to advance the creation and access to internet-based digital content, regardless of location, information content or form". This development will provide faculty a rich base of content to incorporate into course materials.

CALIFORNIA DIGITAL LIBRARY (www.cdlib.org)

Founded in 1997, the California Digital Library (CDL) Project is an additional "co-library" of the UC campuses which focuses on digital materials and services. Several CDL projects focus on collaboration "to create and extend access to digital materials to UC partners and to the public at large." This initiative will no doubt provide vast resources to stimulate life long learning programs.

EDUCAUSE NATIONAL LEARNING INFRASTRUCTURE INITIATIVE (www.educause.edu/nlii)

This organization, launched in 1994, is a membership coalition sponsored by EDUCAUSE. Its mission is "to create new collegiate learning environments that harness the power of information technology to improve the quality of teaching and learning, contain or reduce rising costs, and provide greater access to American higher education".

uPORTAL (http://mis105.mis.udel.edu/ja-sig/uportal/index.html)

This collaborative technology project among fourteen universities, sponsored by JA-SIG is developing a standard university portal. Access to its development site is free. It is an example of universities recognizing both the economics and participant contributions to emerging applications.

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EDITOR'S NOTE: The following reference list contains the address of World Wide Web pages. Readers who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.

3. the authors of the Web pages, not CAIS, are responsible for the accuracy of their content.
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