

THE DEVELOPMENT OF INSTITUTIONAL STRATEGIES

By James J. Duderstadt, Daniel E. Atkins,
and Douglas Van Houweling

The Strategic Context for Decisions

Information technology presents us with a temporal dilemma. Because of the exponential evolution of this technology, event horizons for dramatic change are much closer than we think they are. For example, getting people to think about implications of accelerating technology learning curves as well as technology cost-performance curves is very important. There are staggering increases in efficiency for an organization if one can reorganize its fundamental activities to take advantage of technology, but many colleges and universities continue to look at IT as a cost rather than seeking to understand its cost-benefit characteristics.

From James J. Duderstadt, Daniel E. Atkins, and Douglas Van Houweling, *Higher Education in the Digital Age: Technology Issues and Strategies for American Colleges and Universities*, ACE/Praeger Series on Higher Education. Copyright © 2002 by The Oryx Press. Reproduced with permission of Greenwood Publishing Group, Inc., Westport, CT.

Surveys of campus leaders suggest that most attention is being focused on near-term issues, for example, determining what information technology infrastructure for campus-based activities is necessary and how to finance it. Although academic leaders are most concerned with the implications of electronic learning environments and distance learning, many campus administrators and IT professionals are immersed in the challenge of upgrading antiquated administrative computer systems and replacing them with enterprise resource planning, knowledge management, or e-business systems, at rather considerable expense.

So what do presidents, trustees, and other leaders of our academic institutions need to know? What new technologies are likely to roll out next? Where are they likely to see the first impact on their institutions? Where are various possible decisions likely to take them? These may be the questions of most interest to some, but we rather think that most leaders are more concerned with how they create the academic environment that students and faculty need for high-quality teaching, learning, and scholarship. They recognize that this will require a trade-off of investments between bricks (conventional physical infrastructure) and clicks (information technology). Increasingly, most realize that they can no longer approach these issues in isolation. They must seek partners, both within the higher education enterprise and beyond to include the commercial and government sectors and possibly even international collaborators.

Certainly, it is important that both planning and decisions address the issues and realities of the present. Technology really does not tell us what will happen or what to do next year. The more distant the future, the more exciting and distracting it can become. Universities should always keep in front of them the need to make decisions about issues of today, even as

The more distant the future, the more exciting and distracting it can become.



they consider and influence possibilities for the future.

Time is of the essence. To capture the opportunities that will be available to universities in the knowledge-driven era—or for some, even to survive—profound and far-reaching commitments must be made quickly. These commitments must be made explicitly and publicly and must be accompanied by the investments of talent and funds that can make them real. This will be a challenge in environments long acculturated to deliberation and skepticism of fads and trends originating in industry.

University leaders need a long-term strategic context to enable near-term decisions. It is important to make informed investments and launch creative initiatives today, but within a framework for the longer term. Among all of our social institutions, universities are particularly obliged to look to the long term, seeking not just the quick fix but rather the longer-term strategy and necessary commitments.

Some Assumptions for the Near Term

In considering these issues, we make several assumptions about the evolu-

tion and availability of information technology for the near term (10 years or less):

- Information and communications technology will continue to evolve exponentially, following Moore's law for at least the foreseeable future.
- Ubiquitous, high-speed, and economically accessible network capacity will exist nationally and to a great extent globally.
- Affordable, multimedia-capable computers (including network appliances) will be commonplace, and most colleges and universities will expect student ownership of such devices.
- Most colleges will deliver some portion of their instructional missions both on campus and beyond via the Internet.
- As the ability to use technology in the support of instruction improves; the differentiators of technology-enriched course offerings will continue to be price, quality, and access.
- Nontraditional sources of university-caliber instruction, such as software developers and publishers, are likely to become increasingly important suppliers of course content and materials.
- The employment relationships between academic institutions and their faculty will become even more complex.
- Within this time frame the laws that govern intellectual property will change significantly. In particular, the application of publisher-preferred protections to the digital distribution of copyrighted materials is likely to have enormous revenue and expense implications for higher education in general and for technology-enriched instruction in particular. The legal and economic management of university intellectual property will become a complex area of activity.

Leadership on technology issues must come from the president and the provost.



Key Recommendations

Let us now turn our attention to several specific recommendations for university leaders faced with the challenge of leading their institutions in the face of rapidly evolving digital technology. We have grouped these into seven specific recommendations or steps intended to help leaders shape a strategy unique to the circumstances, challenges, and opportunities facing their institution.¹

Recommendation 1: University leaders should recognize that the rapid evolution of information and communications technologies will stimulate—indeed, demand—a process of strategic transformation in their institutions.

We stress throughout this book the degree to which digital technology is reshaping both our society and our social institutions. Its exponential pace of evolution drives rapid, profound, unpredictable, and discontinuous change. It is a “disruptive” technology,² eroding conventional constraints such as space, time, and monopoly and reshaping both the

structure and boundaries of institutions. The terms used to describe IT-driven change such as “e-business” and “e-learning” are simply metaphors for the pervasive, ubiquitous connectivity between and among people, knowledge, activities, and markets enabled by digital technology. In this sense, then, “E-business transformation” or “e-learning transformation” is in reality a very fundamental transformation process, driven by technology but involving people, organizations, and cultures. It must be addressed both systemically and ecologically.

More specifically, decisions involving digital technology raise very key strategic issues for colleges and universities requiring both the attention and understanding at the very highest levels of institutional leadership. Technology is comparable in importance to other key strategic issues such as finance, government relations, and private fund-raising where final responsibility must rest with the president. The pace of change is too great and the consequences of decisions too significant to simply delegate to others such as faculty committees or chief information officers. The road ahead is littered with land mines and tipping points that require informed attention by the executive leadership and governing boards of academic institutions. Leadership on technology issues must come from the president and the provost, with the encouragement and support of the governing board.

Here colleges and universities face significant challenges, since not only is their leadership frequently inexperienced or uncomfortable with digital technology, but many institutions have only limited in-house expertise in these areas. Furthermore, few academic institutions have experience in the type of broad strategic planning and transformation process required by information technology. As a consequence they all too frequently rely

on outsourcing not only technology but also technology strategies, wasting both valuable time and significant financial resources on ill-conceived initiatives. While it is certainly true that the hardware, software, and applications systems are usually best procured from commercial vendors, colleges and universities must develop sufficient expertise and experience at the leadership level to launch and guide the necessary process of institutional transformation at the strategic level.

Recommendation 2: It is our belief that universities should begin the development of their strategies for technology-driven change with a firm understanding of those key values, missions, and roles that should be protected and preserved during a time of transformation.

Colleges and universities need to begin the development of a technology strategy by addressing the most fundamental questions:

- How should the university set priorities among its various roles such as education of the young, the preservation of culture, basic research and scholarship, serving as a social critic, and applying knowledge to serve society?
- Which of its values and principles should be preserved, and which should be reconsidered? Academic freedom? Openness? A rational spirit of inquiry? Sustaining a community of scholars? A commitment to excellence? Almost certainly. But what about shared governance? Tenure? Are these values to be preserved?
- How will colleges and universities define their students? As the young? As adults? As established professionals and perhaps even academics? The best and brightest? Members of broader society? The workforce? Local, regional, global populations?

- How will we define our faculty members? As the products of our graduate schools and research laboratories? As practicing professionals (à la University of Phoenix)?
- What is the role of the residential campus in a future in which knowledge-based activities such as learning become increasingly independent of space and time (and perhaps reality)?
- How should the university address the rapidly evolving commercial marketplace for educational services and content, including, in particular, the for-profit and dot-com providers?
- What policies does the university need to reconsider in light of evolving information technology (e.g., intellectual property, copyright, instructional content ownership, faculty contracts)?
- Will new financial models be required? Beyond the need to implement a sustainable model of investment in information technology infrastructure, the intensely competitive marketplace for higher education services stimulated by digital technology will put at risk the current system of cross-subsidies in funding university activities.
- Just-in-time lifelong learning and the growing desire to be educated anywhere, anytime are driving the demand for distance education. How should the university approach the challenges and opportunities of online distributed learning?
- What is the role of universities with respect to the “digital divide,” the stratification of our society—our world—with respect to access to technology?
- Will more (or perhaps most) universities find themselves collaborating and competing in a global marketplace, and how will that square with regionally supported universities?

Again drawing from the experience of the business world, most companies have found that the key to e-business transformation is to first return to the fundamentals, to begin with their core mission and how they provide value to their customers.

Recommendation 3: It is essential to develop an integrated, coordinated technology strategy for the institution in a systemic and ecological fashion.

Digital technology is pervasive, affecting every aspect and function of the university, from teaching and scholarship, to organization, financing, and management, yet a major challenge on many campuses is that there are too many people doing their own thing, independently of one another. Although many faculty, staff, and students are knowledgeable about the applications of technology in their narrow field of interest, broader awareness of institution-wide issues is a challenge. Furthermore, many faculty members simply do not understand the imperative nature of the need for a technology strategy. They are unaware of both the applications and implications of technology to their own activities, much less the broader university. There is a digital divide at many levels throughout the contemporary university.

It is difficult to coordinate the various silos of activities into a coherent structure. A technology strategy must be systemic, drawing together diverse applications such as instruction, research, libraries, museums, archives, academic computing, and university presses. However, it must also recognize and accommodate the very great diversity among university activities. Like a biological ecology, a technology strategy should be open, complex, and adaptive, with sufficient robustness and diversity to respond and adapt to the diverse and ever-changing needs of academic programs.

Information and communications technologies are tools for creating

and enhancing connectivity, of strengthening the sense of community across distance and time. More abstractly, this technology supports the knowledge environment to enable knowledge creation, dissemination, and preservation of knowledge communities.

Recommendation 4: Universities need to understand the unique features of digital technology and how these affect people and their activities.

We have stressed many of the unique features of digital technology, for example its exponential rate of evolution, its pervasive and ubiquitous nature, its ability to reproduce knowledge objects with perfect accuracy at zero cost, while transcending the constraints of space and time. The ever-accelerating tempo of digital technology poses great challenges to institutions. For example, today the software testing cycle is not much

There is
a digital
divide at
many levels
throughout the
contemporary
university.



longer than the software usage cycle for many applications. When the power for a given price doubles every 18 months or less, rapid obsolescence disrupts conventional infrastructure planning process. However, the most dramatic changes are driven not by the technology itself but rather by its applications.

The expectations of today's students (not to mention faculty and staff) are rising rapidly. They are accustomed to the convenience of electronic banking, mobile communications, and Web-based retailing (à la Amazon.com or Travelocity.com) and do not tolerate well the archaic, paper-based, queue-dependent cultures of universities. They also are accustomed to independent choice, not simply in technology but in sources of information. Compounding this is the changing nature of the "e-economy" in which business processes become more dynamic and activities become more transparent. Product reviews and price comparisons are now easily accessible on the Web. Web-based auctions (e-Bay) and AI-based purchasing agents are revolutionizing the nature of commercial transactions. Barriers to the entry of new competitors are falling, leading to the vertical disintegration and restructuring of entire industries.

Several examples illustrate the profound nature of the transformations in higher education driven by these characteristics of digital technology. Thus far we have focused most of our attention on the use of digital technology in the classroom experience, enriching it through access to original materials, augmenting it with on-line student-to-faculty and student-to-student dialogue, and distributing it through networks. The pervasive nature of this technology suggests far broader application across the campus learning environment to augment and enrich all learning experiences. We have long promoted the value of the residential campus experience as an environ-

ment for the intellectual and emotional maturation of young students. From this holistic viewpoint, we need to examine the full range of learning experiences—formal, informal, experiential, collaborative—to better understand the potential applications of information and communications technologies. For example, what in the interaction between a faculty member and the student provides a richer learning experience than classroom lectures and textbooks? How could digital technology impact community service activities or the diversity objectives of the university? We need to keep in mind that information technology is not a broadcasting technology but bi-directional (actually, multidirectional) medium. It allows institutions not only to connect with alumni and others off the campus but to enable meaningful interaction of off-campus experts with on-campus academic programs and

The most dramatic changes are driven not by the technology itself but rather by its applications.



students. One can imagine a future in which digital technology will allow students to learn all the time, taking several majors at once, interacting with others, with knowledge resources and with instruments around the world in a seamless, time- and distance-independent way.

A second and, to many, more disturbing example: we have noted that information technology makes more transparent and dynamic the various activities and transactions of institutions. In particular, it demands a more rational—or at least competitive—configuration of activities, requiring organizations to focus on those activities where they are really strong (e.g., their core competencies) and outsource those where others are more capable. When one recognizes that the current portfolio of the contemporary college or university is determined more by history and happenstance than rational decisions, much less the marketplace, it is logical to expect that academic institutions will need to think about unbundling some of the activities that they have accumulated over the years because of the digital revolution. For example, which among the typical activities of the university are truly core competencies? Undergraduate education (including socialization)? Researcher training? Knowledge creation? Knowledge archiving (libraries)? Publication? Professional training? Most would probably agree with these, but what about entertainment (intercollegiate athletics, theater, concerts)? Hotel services? Alumni travel? Health care? Lest we forget, universities do from time to time spin off activities—usually reluctantly and awkwardly but nevertheless sufficiently to demonstrate an "existence theorem" for the process.

E-learning will bring about many changes in higher education. Students, who historically have come to learning sites, will increasingly participate at locations remote from the campus and the instructor. Rather

Universities should seek to synchronize, rather than homogenize, their activities.



than being affiliated with a single institution, they may be associated concurrently with multiple providers and modes of instruction. Educational services will become unbundled, with different providers carrying out various functions: curricular development, delivery of instructional modules, provision of student services, student evaluation, and awarding of credentials. Students will assume greater control over their educational experiences by designing programs that fit their specific needs with regard to program content, length, delivery mode, and location. Program completion will be defined increasingly by the knowledge gained and skills mastered rather than credit hours earned.

Faculty roles and work patterns will also change. Less emphasis will be placed on lecturing and greater emphasis on facilitating the educational process, for example, by providing learning assistance in time patterns and modes tailored to the needs of individual students.

In summary, it is likely that almost every function—and especially every valuable function—will be affected by

and possibly displaced by digital applications. Competitors will appear and will in many cases provide more effective and less costly alternatives. Universities can embrace the new techniques themselves, outsourcing some of their functions while maintaining their vertically integrated missions, or they may find themselves on a downward economic spiral. It will likely take some time for the full impact of this unbundling to be felt, but even small shifts in the high-value activities could degrade the university's character and structure.

Recommendation 5: Universities should aim to build layered organizational and management structures, based upon broadly accepted values, strategies, heuristics, and protocols at the highest levels but encouraging diversity, flexibility, and innovation at the level of execution.

Identifying and implementing the organizational and management structure appropriate for digital technology are major issues—and barriers—at most institutions. Even the most technology-sophisticated universities have struggled to find an effective structure, oscillating between centralized and decentralized approaches, frequently seeking the counsel of information services consultants experienced with e-business transformation, and spending tens of millions of dollars. Most universities are still struggling with organizing the “IT commons” in a way that is compatible with the distributed nature of the contemporary university. Furthermore, identifying the boundary of the university becomes more difficult as the interface with society becomes ever more porous.

Such challenges are likely to continue. After all, the Net and related digital technologies are dropping the costs of transactions and data access by many orders of magnitude. Distance has become almost irrelevant, with national and global connectivity

becoming both inexpensive and pervasive. The ubiquitous nature of digital technology and the distributed nature of the university seem incompatible with the traditional hierarchy of management.

All organizations, whether in higher education, commerce, or government, face a quandary: should they centralize, through growth or mergers, becoming conglomerates to take advantage of economies of scale, standardization, and globalization, or should they decentralize, seeking autonomy, empowerment, and flexibility at the level of unit execution, while encouraging diversity, localization, and customization? Which path should they choose?

Actually, both and neither. There is no unique way to organize technology-based activities, although it is likely that most colleges and universities are currently far from an effective or optimal configuration. Furthermore, flexibility and adaptability are the watchwords for any such organization during a time of extraordinarily rapid technological change. The challenge is to orchestrate and coordinate the multiple activities and diverse talent on campus that explore and transform the application of digital technology in education. In effect, technology-driven transformations can be viewed as a collective R&D project for the institution.

The key to achieving this is to build layered organization and management structures. At the highest, centralized level one should seek a clear institutional vision, driven by broadly accepted values, guided by common heuristics, and coordinated through standard protocols. Below this at the level of execution one should encourage diversity, flexibility, and innovation. In a sense, institutions should seek to centralize the guiding vision and strategy, that is, determine “where” the institution should head, while decentralizing the decision process and activities that determine “how” to achieve these in-

stitutional goals. Put another way, universities should seek to synchronize, rather than homogenize, their activities. Rather than obliterating silos of activity, one should use standard protocols and infrastructure to link them together, creating porous walls between them.

All of this may accelerate the diversification of the academic community already well under way with the expansion of institutions, the specialization of academic subjects, and the focus on outside sources of funding and support from both government and the private sector. The atomization of the academic community increases the power of institutional administration. The transformations implicit in the introduction of IT to the curriculum are beyond the powers of academic senates or committees of

amateurs to govern or steer. As our society moves from elite, to mass, to universal education, the role of the central administration becomes stronger and that of academics weaker.

Public universities will face particularly serious challenges, since they are accountable to public authority and therefore averse to risk, and IT is an area where risk and success are closely linked. A large public university is too big and its authority too widely dispersed to make rapid decisions. Individuals and units need to be able to make many small, rapid, risky, and relatively inexpensive decisions from below and have the opportunities and resources to experiment.

Recommendation 6: One should recognize that the investment in technology infrastructure necessary for

higher education in the digital age not only will be comparable in expense to physical and human capital but will be pervasive and continually evolving throughout the institution.

We noted earlier that the IT infrastructure necessary to sustain university activities and administration is quite extensive, including not simply hardware (computers, networks) and software (operating systems, middleware, learningware, administration applications) but as well extensive human resources and skills (support and administration of IT systems). Just as with the organization and management of the university, we need to seek a layered or tiered architecture for digital technology that is characterized by a unified “back-end” or centralized infrastructure and

diverse and flexible “front-end” applications. Modularity and tiering are the keys to effective technology acquisition and implementation strategies. Connectedness and interoperability are key criteria in IT infrastructure design.

Technology synergies must be achieved when the different technologies are combined. For example, we will need ubiquitous networking of voice, data, and video. We will need many layers of systems and facilitating applications, including fully integrated academic/administrative systems, client/server-based applications, object-oriented customer service systems, enhanced input/output capabilities, such as info kiosks, workstations, personal digital assistants, notebook computers, and knowledge navigators.

Part of the challenge is the accelerating pace of evolution of this technology and the difficulty in predicting its twists and turns and the next “killer app.” For example, many universities were making major investments in minicomputers (PDPs, VAXs) in the early 1980s, just as the personal computer appeared. The introduction of the network browser with the appearance of Mosaic in 1994 (and then Netscape and Internet Explorer) turned traditional enterprise systems on their head, demanding new Web-based services and e-commerce. If Bell Laboratories and others are successful in stimulating the transition from electronics to photonics and wireless technology, the massive investments that colleges and universities have made in networking infrastructure (their “wire

plant”) may rapidly become obsolete.

The same can be said for software evolution and administrative systems. Many universities have made massive investments in reengineering legacy administrative systems, in part to prepare for Y2K and in part to drive change in administrative processes. However, the promises of reengineering remain unrealized for many institutions. In many instances, large, expensive systems designed to institute change have been only partially implemented, often with less than expected results. Many institutions have moved on to enterprise systems implementations to integrate student, financial, and human resources systems that are an order of magnitude more expensive. All too often these centralized systems make the organization conform to technology rather

than vice versa. They essentially force academic activities such as teaching and research to conform to business IT systems. While administrative systems such as enterprise resource planning (ERP), customer relationship management (CRM), and knowledge management systems (KMS) can be useful to the administrative side of the university, they can sometimes work at odds with the academic activities.

So, too, the changing nature of the core academic activities will demand changes in infrastructure. A new educational model is evolving to serve the needs of the digital age. Barriers to learning must be replaced with mechanisms to facilitate the new styles of learning for the digital age: open learning (open access), just-in-time learning, and just-for-you learning (unbundled, customized learning). In

a world in which both the student body and the professorate become more and more mobile, telecommuting and telelearning and physical infrastructure, although still necessary, may decline in relative importance to robust network connectivity. Expensive research facilities will become increasingly shared resources rather than the responsibility of a single campus, but then requiring high-speed data links. Digital technology will not only facilitate but drive collaboration and hence alliances.

Recommendation 7: Getting from here to there requires a well-defined set of operational strategies and tactics aimed at institutional transformation.

We are in the very early stages of technology-driven tectonic shifts that

will reshape our institutions and our enterprise. Although the university as a social institution has survived largely intact for over a millennium, it has done so in part because of its extraordinary ability to change and adapt to serve society. Beyond vision, organization, and investment, universities need a well-defined set of operational strategies and tactics. Technology-driven transformation should be viewed as steps up a ladder rather than down a road, since at each level a new set of challenges will arise. Timing and the pace of change are everything, since if these are incompatible with the capacity of the institution, strong resistance and possibly even chaos can be the consequences.

The capacity for change, for renewal, has become an important objective in other sectors of our society.

As history has demonstrated, change in the university is rarely driven from within.



We frequently hear about companies “restructuring” or “reengineering” themselves to respond to rapidly changing markets. Government is also challenged to transform itself to be more responsive and accountable to the society that supports it. Transformation for the university is necessarily more challenging, since our various missions and our diverse array of constituencies give us a complexity far beyond that encountered in business or government. As history has demonstrated, change in the university is rarely driven from within. After all, one of the missions of the university is to preserve time-honored values and traditions. So, too, tenured faculty appointments tend to protect the status quo, and the process of shared governance provides the faculty with a mechanism to block change. Most campus administrators tend to be cautious, rarely rocking the boat in the stormy seas driven by politics either on campus or beyond. Governing boards are all too frequently distracted from strategic issues in favor of personal interests or political agendas.

Earlier examples of change in

American higher education, such as the evolution of the land-grant university, the growth of higher education following World War II, and the evolution of the research university, all represented reactions to major forces and policies at the national level. The examples of major institutional transformation driven by internal strategic decisions and plans from within are relatively rare. Change is a particular challenge to the public university, surrounded as it is by powerful political forces and public pressures that tend to be conservative and reactionary.

Of course, transforming an institution as complex as the university is neither linear nor predictable. Transformation is an iterative process, since as an institution proceeds, experience leads to learning that can modify the transformation process. Furthermore, a university must generally launch a broad array of initiatives in a variety of areas such as institutional culture, mission, finance, organization and governance, academic programs, and external relations, all of which interact with one another.

It is important to challenge an institution with high demands and expectations. However, leaders should also recognize that for most institutions the limiting factors will be the availability of human resources. Few among the faculty or administrative staff understand adequately the nature and implications of digital technology. There are even fewer capable of leading a process of change. While universities typically look to their IT organizations or libraries for such leadership, it is more likely to exist among the faculty, with those who have actually utilized state-of-the-art digital technology in the fundamental academic activities of the university, teaching and research.

There is another important constituency capable of driving change in the university: students. This should not be surprising to those fa-

miliar with the history of higher education, since students have frequently driven change in the university, ranging from the stimulation of new academic programs to its responsiveness to rapid social change. Furthermore, many students, particularly at the graduate level, drive much of the intellectual momentum of the university through their research activities. As we noted earlier, the plug-and-play generation is far more comfortable with digital technology that most of the current generation of university faculty and leaders. They not only are more adept in applying the technology to their own activities but frequently play key roles in its development (as the numerous IT start-ups led by undergraduate and graduate students make apparent). With technology, just as with other issues, students are likely to be a powerful force driving change in higher education.

Each of our colleges and universities will face different challenges and pursue different strategies during this period of change, and appropriately so. Small, private colleges and universities are likely to focus more on niche markets, determined by geography or academic interests or socioeconomic status. Elite research universities will first attempt to use their wealth—and fund-raising capacity—to build breakwaters against the crashing waves of market changes, buying time for more leisurely, although still inevitable, change. The large public universities will likely be the last to change, constrained by political and social pressures, and could well become like the dinosaurs, unable to adapt.

Notes

1. Why seven? Beyond the fact that our culture is filled with numerous examples of seven steps to one objective or another (e.g., weight loss, profit, or even nirvana), it is also the case that psychologists tell us that seven is the maximum number of points that most people can remember.
2. Clayton M. Christensen, *The Innovator's Dilemma* (Cambridge: Harvard Business School Press, 1997).