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INFORMATION TECHNOLOGY: POLICY DEVELOPMENT IN UNCHARTED TERRITORY

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This chapter is an exploration into how the State of California is addressing the public policy challenges of the information technology revolution. I will first assess how policy makers in California define their leadership role. I will then give specific attention to how these challenges are being addressed in one area of fundamental importance for the people and future of California: public education with references to the private education sector. In the third part of the paper I will review how other states in the United States are approaching these same policy issues, and conclude with some suggestions about what policy makers in California should concentrate on over the coming months.

The Information Revolution

An information technology revolution is going on, and it is of vast proportions, even after discounting for the hyperbole, and there is a great deal of that. This chapter is about State of California policy in information technology, but let there be no confusion that the technology revolution is driven by the genius of the research community that continues to find California uniquely attractive, by the risk taking of the venture capital community, and by the enterprise of the business men and women of the state. California enterprise is a key player in this revolution - as a creator, developer, disseminator and end consumer of these new technologies. Evidence, if evidence is needed can be seen in the statistics

For example, 1,500 of the 2,500 largest electronics firms in the United States are located within 30 miles of downtown San Jose. In Personnel Computer's Eleventh Annual Awards for Technical Excellence, 17 of the 31 products awarded were from California companies or California divisions of international companies.[1] The government sectors can remove barriers to innovation and growth, focus attention on opportunities and problems, and in a small number but strategically important sectors provides the core funding, but government is not the engine that provides the energy or vision.

Information technology has significantly impacted the way individuals work and play. It enhances personal productivity. The fact that almost every public agency in the state has a web site facilitates information about and access to taxpayer funded public services. Californians make heavy use of the Internet. It has been estimated that one-fourth of all Internet usage in the United States is based in California.[2]

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Governments around the globe accept that telecommunications, information services, and information technology - the industry sectors that define the digital terrain - are not only dynamic growth sectors themselves, but are also engines of development and economic growth. Attendant policy debates have gone in different directions but all of them are premised on the ability to improve and maintain the underlying information technology infrastructure. The United States, with its program on the National Information Infrastructure is an example of what this debate has produced.[1]

Perhaps the most dramatic example in the international community is the Multimedia Super Corridor under development in Malaysia. Prime Minister Mahathir Bin Mohamad came to California in January, 1997 and announced that Malaysia intended to "create the best environment to fulfill the promise of the Digital Age," including "the best physical infrastructure that can be offered in the world."[2] He invited the "limitless store of creativity" of California that fuels the entertainment industry to join with the networked technology which can be centered anywhere, much of it hopefully in Malaysia. Closer to home, and close to the main point of this chapter, California has its own information technology policy agenda.

There still exists a great deal of terminological confusion about such terms as information technology, new technologies, digital technologies, multimedia, and information superhighway. In this chapter I will use the phrase "information technology" or the "new information technologies" as general statements for which other people may use one or more of the terms listed above.

The people and economy of California have a huge stake in the information technology revolution. That we know. However, there is far from a consensus of what the proper role of public policy should be in this revolution. As part of the research for this chapter, I mailed a questionnaire to the Governor of each state in which I requested information about what policy initiatives had been taken or were being planned with particular reference to economic and business development and higher education in response to the challenges posed by information technology. Substantive responses were received from twenty-five states often accompanied by copies of reports and policy documents and the inevitable WWW addresses for additional information.

Policy Leadership in Information Technology

Information technology constitutes new conceptual and policy turf for most legislators, many of whom are probably still struggling to draw practical meaning from such terms as multimedia, digital technology, teleconferencing and electronic mail. Because we are dealing in much uncharted territory from a public policy perspective the most common initial action in all of the states that responded to our questionnaire was the establishment of a blue ribbon committee, board or council to come up with suggestions for what the meaning of the new technologies should be for the state and its citizens. These groups almost always had on their membership some combination of prominent

representatives of the established business community, academic researchers, new technology entrepreneurs, and political leaders.

The general direction of the approaches in the twenty-five States that responded to my questionnaire reveals substantial diversity in how they define the appropriate emphasis of state policy, depending in part on which of the state's strengths and deficiencies loomed largest at the time the assessment was made. One common denominator among all the states is that they want to make students computer and Internet literate before they graduate from high school. The other policy commitment that cuts across a wide spectrum of limited objectives is to use the new technologies in university level instruction and to reach adults who do not have easy access to the continuing education offerings of colleges and universities in the state.

Most of the policy suggestions found in the states that responded to the questionnaire fit into one or more of the categories listed below. This priority order list is based on careful reading of the responses but is not intended to convey scientific precision.

1. Direct support to public education so that K-12 students have opportunity to become computer and technology literate; and to the higher education establishment to promote use of new technologies for university and adult instruction.

2. Providing encouragement and, in some cases, direct support (particularly of infrastructure development) for expansion in technology research and development especially if it holds the prospect of directly creating new jobs or stimulating business growth.

3. Promoting use of technologies to improve public services (e.g., web sites and such) and to market economic (e.g., business investment), cultural, and other attractions (e.g., tourism) of the state.

4. Providing incentives for businesses development (tax and related devices), research (especially in states with research universities) and technology transfer for economic and business development.

Governor Pete Wilson has personally provided considerable leadership in focusing attention on the application of the information technologies to help solve current State problems and to position California's educational and economic institutions for the future. In his 1997 State of the State Address the Governor outlined an agenda which included a proposal for a Digital High School.[3] That speech and other messages he has given convey a sense of urgency to the point that California must not delay in preparing its schools and children to harness the power and potential offered by the information technologies.

California also began its technology policy odyssey with the fanfare of a highly touted task force of prominent persons as members to stimulate and recommend policy development. Our review shows that only a handful of states - California not being among them - have developed a comprehensive framework for sustained policy development which integrates the new technologies with other important policy issues of the state such as health, employment, business growth, and administration of state services as well as education.

The contribution of the Information Technology Task Force in California had the salutary effect of providing an opportunity for long range thinking and focusing of public attention. Generally speaking, the concrete actions that are taken bear only a faint resemblance to what was suggested by these blue ribbon committees. Inevitably perhaps actual technology policy is opportunistic in content and, depending on the political and economic circumstances of the moment, can range from articulating high principle to adopting state mandates. Information technology development in its brief history in California has been a dynamic adventure. It has passed through several stages from a kind of casual awareness to making several bold policy choices.

Almost all State of California policy initiatives regarding technology are about economic and business growth and education, especially education. Unlike many other policy debates involving education (such as arts training in public schools) the technology debate in education is about the relationship between education and having a workforce that is trained to lead the economic and business future of California. The California Virtual University - about which more below - was initiated quite explicitly to enlarge access to the training and education needed by workers so that California companies can remain competitive in the global economy. The competitive challenges that California faces are both from other states in the United States and from the global village. There is an assumption in the current policy discussion that the "new technology" train has left the station and that California policy making better get aboard - preferably in the driver's seat. Other states, of course, when debating these same issues view California as the 600 pound gorilla and seek to lure away at least a small piece of the action.

Given the centrality - the origins of Silicon Valley will always be mentioned in this regard - of higher education in the development of California's vaunted technology base there is more than a little bit of pride at stake when any suggestion is made that California is losing it leadership role in the new technology revolution. It is hard to imagine a major political figure willing to withstand the political fallout from this kind of criticism.

The core of this paper revolves around California policy definition and leadership in the new technologies as it relates to education. The policy options available to California in the future are necessarily embedded in the decisions that were taken in the

past. Post-secondary education is at the center of the "knowledge industries." New technologies are embedded in what is usually meant by the "knowledge industries." The new technologies are knowledge intensive, and these technologies will be a principal driver of California's economic competitiveness as we enter the next century. Thus, having a healthy educational infrastructure is crucial to California economic well being.

Information Technology and Higher Education

The most prominent of several California state policy initiatives in higher education - the California Virtual University - came about largely as the result of a negative decision by Governor Wilson, supported by the private and public higher education establishment in the state. Specifically, it was decided that California not be a partner in establishing the Western Governors University (WGU).[4] Governor Wilson stated at that time that "As the world leader in information technology, this state is uniquely positioned to guide education into the information age." The Design Team to develop the California Virtual University is chaired by the Governor's Deputy Chief of Staff. Its members seem broadly representative of the higher education community of the state.

I will proceed by discussing first the Western Governors University, the concept of a virtual university which California rejected. After that I will review the concept of a virtual university which the Governor's design team seems to be closing in on. The WGU and the CVU represent two different approaches to delivering digital education.

What California Rejected: The Western Governors University

The Western Governors University (WGU), is an on-line virtual university with its "doors" scheduled to open in 1997. WGU was officially adopted in June 1995 by members of the Western Governors' Association as a brand-new, high-tech regional learning institution. The new university is to be a market-oriented, independent, degree-granting, accredited, high quality, cost-effective, university. A long term plan is for the university to develop into a non-profit, independent, tax-exempt corporation combining the objective of facilitating the widespread utilization of technologically-delivered educational programming with that of certification through competency testing. The corporate and administrative headquarters of the WGU are located in Salt Lake City, Utah. The academic development headquarters are located in Denver, Colorado. Each of the WGU's participating states will establish at least one center that will provide one-stop shopping for WGU services, including access to the delivering technologies.

Planning for the WGU was organized to move forward under the direct leadership of the region's governors. It is they who assumed responsibility for the removal of barriers imposed by statutes, policies and administrative rules and regulations at both the state and federal levels. At the same time, the planning group got extensive input from the expertise of leaders in higher education, a well known consulting firm, and

practitioners of information technology and public policy. Its pilot program is scheduled to be launched in the latter half of 1997, and the university expects to offer classes by early 1998 from institutions whose courses have been approved for inclusion on the WGU electronic catalogue.

The overall goal of the Western Governors University is (1) to expand access to, and use of, high quality, cost-effective higher education and job training opportunities for traditional and non-traditional students, working adults, and others, across institutional and state lines, and (2) to take the advantage of cost-and resource-sharing opportunities inherent in regional cooperation to reduce the costs of providing these educational opportunities and to expand the variety of courses available to each state's students, and (3) to foster the use of rapidly evolving advanced technologies in the approach to post-secondary education on the premise of delivering instruction from anywhere, to anywhere, at any time, and spur the development of information technology networks within and among western states.

The university plans to rely on the growing availability of advanced communication technologies to link academic institutions throughout the west by a variety of technologies, including the Internet, computer software, CD-ROM's, interactive satellite television, cable TV, two-way TV, videotapes, telephones, computers, modems, e-mail, and voice mail. The university will provide courses via electronic media, and will use an Internet-based WGU Smart Catalog/Adviser developed together with IBM to offer courses, provide student services, and map out the skills that students need to master.

All instructors will come from existing public and private institutions of higher education, and from approved nontraditional providers of education services via advanced technologies. The WGU won't offer its own courses nor employ faculty. Providers will make offerings available through the technologies of their choice. Students will be able to choose courses based on the technologies they prefer or to which they have access.

WGU will be empowered to grant certificates recognized by employers and degrees recognized by both employers and the academic community. As the focus of the program is on whether learning has occurred, the WGU will ground the certification of learning on the basis of assessed competencies rather than the accumulation of credits or experiences, or judgments about the quality of providers. At the beginning, the university will offer an Associate of Arts degree and the Electronic Technician Certificate through existing colleges.

To turn the concept of the WGU into reality the WGU still needs to obtain the necessary start-up funds of over $8 million.[5] During its planning phase, each governor of the WGU's participating states was expected to contribute $100,000. In April of 1997 Western Governors University received very generous donations from AT&T, Sun

Microsystems and from several foundations. The first part of 1997 has been a fundraising success for WGU with private sector contribution totaling over $1.4 million and public sector contributions totaling over $255,000. As of mid-1997 the WGU had raised close to 1.7 million dollars in private and public sector gifts. It is estimated that the WGU will need roughly $25 million in new funding during its first 8 to 9 years of operation. After that, it is expected to begin making sufficient revenues to cover expenditures.[6]

The California Alternative to The Western Governors University: The California Virtual University[7]

Governor Wilson had strong support from all segments of the California Higher Education Community to withdraw from the western governors initiative in favor of a proposal to establish the California Virtual University (CVU). Part of the rationale given in The Executive Order for California to go its own way in digital education was that California was blessed with a leadership position in information technology, entertainment, multimedia production, telecommunications and venture capital and that it made plain good sense to build on these strategic assets of the state rather than become one of thirteen partners in the Western Governors University. This was undoubtedly a correct decision. It was also felt that life long learning through information technology could more readily become part of the core activities of the existing systems of higher education in California by keeping out of the WGU. Finally, Governor Wilson connected directly the CVU and a recommendation he had received a year earlier from the blue ribbon Governor's Council on Information Technology "...that California maintain a healthy economy in part by the promotion of formal and informal lifelong learning and that our colleges and universities can, through information technology and distance education, contribute substantially to this goal...".[8] Not joining the Western Governors University was easy, agreeing on what to create in California proved substantially more complex.

There are no present plans for CVU to become a separately accredited "electronic college" as is true of the Western Governors University. Instead, CVU will focus on promoting the development and distribution of courses and programs offered by the already accredited colleges and universities in the state. If there are certificates or degrees to be awarded on the basis of courses promoted by CVU they would be awarded by the institution or campus in which the students are enrolled. Thus access to CVU courses is through enrollment in an existing university or college.[9]

It is useful to keep in mind several other characteristics of the CVU.   The organizers of this initiative view development and marketing of an on-line catalog of the courses available in the State's Colleges and Universities as a primary activity of the CVU. Many campuses are already in the business of offering On-line education and publish the courses that are available in this way. But it is felt that the CVU On-line Catalog will result in significant economies of scale, and provided an important service

to potential customers, compared with each institution doing this on its own. Visitors to the CVU web site would have readily available information about launches of on-line distance learning programs and other such information. In many ways the CVU will be mainly an electronic bulletin board which serves as a gateway to the on-line course offerings of the State's colleges and universities. The design team for the CVU struggles with thorny issues such as the meaning of an academic term when the present pattern is a patchwork of quarter and semester based institutions with different starting and ending dates. Also of concern is reciprocity among institutions in allowing course credit, and maintaining quality control. Perhaps the biggest design challenge of all will be to come up with an approach that is compelling enough so that people will actually use it.

Governor Wilson in his letter to the Western Governors' Association informing it that he would not sign the memorandum of commitment noted that the California State University already enrolled more than 14,000 students in on-line programs. He also noted that all campuses of the University of California have continuing education programs which also use on-line instruction extensively. Indeed, at several campuses of the California State University it is possible even now to obtain a degree without ever having taken a course on the campus from which the degree is obtained. Presumably if these customer-oriented, student-centered on-line programs attract significant enrollments other campuses will follow suit.

Other reasons given for the establishment of the CVU is that it will provide a vehicle to deliver training and education to Californian workers to compete in the global economy. As well, the CVU is expected to serve the continuing education needs of professionals who because of time and distance cannot available themselves of offerings of existing higher education institutions.

As so often happens in California what excites the Governor and Legislature about the potential of making information technology a driver of educational innovation - reaching more students with work relevant education at lower per capita costs - is different from how the University of California, and, to a somewhat lesser degree, the California State University want to respond to these same opportunities. There is little likelihood that the CVU will become a degree granting institution anytime soon, which will make it a very different institution from the Western Governors University. Its characteristic as an electronic bulletin board which promotes the development and distribution of courses and programs already offered by accredited California colleges and universities make it an adjunct service only. The California State University has been significantly more aggressive than the University of California in developing on-line and other forms of technology based certificate and degree education. If the on-line CVU is successful in marrying educational technology with a strong customer oriented education and eliminates barriers that hamper the delivery of high quality instruction on-line we might anticipate a rapid rise in on-line degree offerings.

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All general campuses of the University of California and most of the twenty-two campuses of the California State University already have self-supporting, customer oriented, entrepreneurial, distance education - or university extension as they are more commonly known - operations. They specialize in making a broad range of educational offerings available to individuals, in the classroom and through technology, who because of work or other reasons cannot become a regular daytime students. All of these continuing education operations are moving rapidly into all of the various forms of on-line education. It is not obvious that what the California Virtual University intends to provide could not be better met by building on the existing continuing education capabilities in the State's two university systems. Perhaps UC and CSU should be jointly charged with the responsibility of using their vast experience in distance education to develop an arrangement - which encompasses the CVU - to make expanded technology based educational opportunity available to the broadest possible segment of California's population.

Richard Atkinson, The President of the University of California, applauded the Governor's Executive Order establishing the CVU Design Team: "I am wholeheartedly in support of the Governor's decision to explore the use of advanced technology to increase access to the rich academic resources available in the high-education institutions of California."[10] Barry Munitz, Chancellor of The California State University stated on the same occasion: We welcome the opportunity to work with our colleagues in implementing a model of cooperation that would serve the needs of California and its rising student enrollments, while demonstrating that we can do business differently. Such an effort would allow for easy articulation among California's colleges and universities and permit us to expand the reach of all our institutions outside the state and nation and thereby generate revenues for education in California."[11]

In summary, in the policy debates about the California Virtual University and in the debates within the post-secondary education community of the state, the assumption has taken hold that every learner (indeed every citizen) has the right to have access and use of information technology and communication resources in the classroom, workplace, home, and community. This consensus is destined to have immense consequences in the future for the State of California - its economy, its citizens and for its existing educational institutions.

Technology Based University in the For Profit Sector: The University of Phoenix [12]

As one of three subsidiaries wholly owned and operated by the for-profit higher education corporation, Apollo Group, Inc., the University of Phoenix is a for-profit higher education institution that provides, through new education technologies, general education and professional programs for working adults regardless of their geographical location.

The University of Phoenix (UP) was founded in Phoenix, Arizona 20 years ago by John Sperling, a maverick San Jose State University economics professor. It was first accredited in 1978 by the Commission on Institutions of Higher Education. The university now runs its On-line Degree Program, a Center for Distance Education, and operates some fifty-one 51 campuses and three Learning Centers throughout the US and the Commonwealth of Puerto Rico. It has become the nation's second largest regionally accredited private institution for business and management.[13]

UP describes its mission to provide working adults with high quality continuing education, professional degrees and certificates in extended geographical sites. It wants to use distance education technologies that allow students to advance their personal and professional goals without leaving the workforce or sacrificing their families. UP participates in all of the Federal Financial Aid programs. Degree-seeking students enrolled in eligible programs may apply for financial aid as a means of assisting them with financing their education. Otherwise, students register and pay tuition at the first class of each course.

UP advertises itself as a highly interactive and experience-based educational enterprise, a learning alternative to the costly residential campus model. All technology learning applications are directed at solving a business problem or enabling a better way of doing business, as well as supporting the teaching and learning model. At present UP provides undergraduate degrees in business, management, information systems, nursing, and accounting. Graduate degree programs are available in business, management, nursing, education, counseling, computer information systems, and accounting. In addition to degree programs the university offers certificate programs at physical campuses and learning centers, and on-line. The Learning Resource Centers of UP provides electronic access to millions of citations in hundreds of on-line databases and are an integral link between the academic programs of UP and the learning or library resources needed by students.

Students must be at least 23 years of age, and employed, to qualify for admission to UP. Since its establishment, the university has enrolled more than 371,000 working professionals in all of the fifty states, and dozens of foreign countries. Currently, it enrolls some 35,000 full-time equivalent working adult students. Of these some 3,100 of the students are pursuing degrees. UP employs approximately 6,000 faculty and staff. The faculty is comprised of working practitioners, experts in their field. Teaching faculty must hold earned master's or doctoral degrees from a regionally accredited institution. They possess an average of fifteen years practical experience in the field related to the subjects they teach.

The California Digital High School Initiative of 1997

In August, 1997, the Legislature approved and Governor Wilson signed the Digital High School Education Technology Grant Act of 1997, to take effect

immediately as an urgency statute. The Legislature - in approving the Act - declared as policy that all high school pupils must be "computer literate" before they complete high school, and that computer skills are essential for individual career success and vital to the continued economic prosperity of the State of California. The Digital High School Initiative, as the Act is labeled, is intended to provide California's 840 public high schools with comprehensive computer networks and permanent, ongoing funding for maintenance, upgrades and technical support. The idea is to provide all high school pupils with basic computer skills and to realize more fully the potential of computer technology in other aspects of high school education such as research and report writing, and data analysis.

One-hundred million dollars ($1 billion over four years) were earmarked for the first year of the program - enough to cover state grants to 200 high school. This included a one-time grant of $300 per student, to be matched by local school districts, to establish a computer network in each public high school. Additional funding is expected to be provided in the Governor's next budget, and in the following two years. The program will phase in over four years and:

> It is the intent of the Legislature that all high schools in the state become 'digital high schools' by the end of the first year of the 21st century and that these schools fully integrate computers, networks, training, and software to achieve computer literacy in all public and faculty and to improve academic achievement.[14]

There is a good prospect that continued funding for this initiative will be provided because funding is within the approved constitutional mandates. The law requires the Superintendent of Public Instruction to annually report to the Governor and the Legislature on the previous years accomplishment pursuant to the digital high school legislation.

It is apparent that this ambitious program cannot succeed in the absence of teachers trained to operate in a digitally alive learning environment. The legislation anticipated this problem and provided incentives for staff training. It is too early to tell whether this approach will prove adequate. However, it is worth noting that the Governor mobilized the active support of quite a large number of nonprofit organizations. These include the American Electronics Association, the California Business Roundtable, and the Software Publishers Association in launching this initiative.

Policy Development In Other States

What are the other forty-nine states doing? Twenty-five states provided detailed information about their approach in response to our questionnaire. Every state seems to be engaged - almost urgently so - in a planning process via establishment of a council,

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board or committee to propose policy priorities and identify comparative advantages for the state.

Although it lacked specifics, Senate Bill 994 passed by the Oregon Legislature and signed by the Governor sets forth a compelling challenge, "To use information technology in education, health care, economic development and government services to improve economic opportunities and quality of life for all Oregonians regardless of location or income."[15] This is as broad a commitment to built technology into many of the most important sectors of economic and community life as we encountered in our review of the technology policies of various states.

Institution of higher education in most states are using or gearing up to use telecommunications technology to deliver instruction to students at sites remote from the main campuses. They do this through one or more of the following: open broadcast television, satellite (one-way video, two-way audio, and data), micro wave, and compressed video (two-way video, audio, and data) via special high-speed transmission lines (T1 lines and/or fiber optic cable) to offer college credit or continuing education classes. Many institutions have sprung up the past several years that offer course or complete degree programs by on-line computer via the Internet and WWW.

Penn State, a major research university, has made a strong commitment to what they call the World Campus through which they plan to be leaders in offering on-line undergraduate, graduate and certificate programs nationally and internationally. It also plans to enter into partnerships with other universities around the world through which they can pool courses and faculty to create new degree programs which draw on the faculty talent of the partnering institutions. Among the critical issues that must be solved before the World Campus is fully operational are matters to technical capacity (which will be significantly enhanced when Internet2 is full operational) and technical compatibility across institutional and geographic boundaries. Software and infrastructure compatibility are major concerns as use of digital networks grow.[16] The Sloan Foundation recently awarded Penn State $1.3 million to advance its World Campus initiative because among other reasons "...with the World Campus, Penn State will provide worldwide access to its faculty expertise."

A considerable amount of looking over the shoulders at what other states - especially California and Texas - are doing is going on. There is fear that if the states don't move quickly they will be left behind. But there are differences among the states depending on the particular geographic, economic and social circumstances that confront them. In Alaska, for example, with its vast distances, disparate and sparse population and severe climate using technology to deliver government information and services gets a great deal of attention. In turn, this has generated a debate about the extent to which the state should own and operate the networks and infrastructure versus when the state should rely on arrangements with private telecommunications provides to answer its needs. One report notes, "It is not enough for the State to provide information and the

ability to transact business on-line unless there is a good-faith attempt to make sure citizens have access from all over Alaska."[17]

Distance education and the use of educational hardware and software for achieving specific educational objectives is a hallmark of policy in many states. Making students "work-force ready" and continuing education to maintain skill levels receive sustained attention. Georgia is one state that seeks a national leadership role in development and use of instructional technology.[18]

As already discussed one of the most ambitions initiatives is The Western Governors University which seems to have been the brain child of Governor Romer of Colorado, and Governor Levitt of Utah. Governors of fifteen western states have committed to the development of this institution.[19] While California in a well publicized move elected to withdraw from the WGU initiative, Texas, which was not part of the original group of founding states asked to be included after the WGU had already been formally launched.

In one form or another all states have established specific programs to encourage greater collaboration between private industry and public colleges and universities to develop and apply technology. Brokering partnership agreements between companies and universities to provide technical assistance and to develop and commercialize the new technologies are illustrative of this trend, and a useful role for agencies of state government to play.

Conclusions

Review of what other states have done, and the areas in which information technology issues have been addressed in California suggests that initiatives on statewide information technology planning are crucially dependent on the strength of the governor's support and legislative mandates and funding. In California, and particularly so in the educational initiatives, leadership has come mainly from the governor. California has not developed nearly as comprehensive an approach as have many other states, including those (e.g., Georgia, Indiana, Minnesota, Texas) which have achieved a national reputation for leadership in telecommunications and distance education planning. How do other states do it and does California have anything to learn from them? Some states (e.g., Minnesota) create statewide boards or councils to coordinate across the full spectrum of information technology planning and action. A key question in this regard is whether education should be separated out from whatever mechanisms are established for other planning.

There seems to be a national movement in the direction of creating separate structures to generate educational initiatives and to promote statewide coordination of educational information technology. At the post-secondary level, the California Post-secondary Education Commission (CPEC) has the broadest mandate now to provide

leadership on behalf of all segments of higher education. But there is little evidence that CPEC has been given or that it plans to assert a strong statewide role in education technology matters. In most other states the equivalent of CPEC is expected to be a key player in education technology and distance learning matters. In California, more than in most other states, most of what is important in distance education is occurring away from state government. There will be important issues of quality assurance in distance education programs. Perhaps only a statewide agency can effectively assume the role of quality assurance guardians for state citizens and consumers.

The California Virtual University and other such undertakings can make an important contribution to meeting certain educational needs of persons who do not have access to conventional classroom because of cost, distance or work requirements. This initiative undoubtedly merits public support - probably at a significantly higher funding level than is currently anticipated - because of what it can do to help prepare a qualified workforce for the future.

However, Jack Peltason, former president of the University of California, cautions against the mentality of "technology fix".[20] The likely future emphasis in "distance" education will be on anytime-anyplace learning, particularly for adult students whose schedule does not permit regular class meetings. For this to be done in a quality way California will need to engage the most visionary designers, grounded policy makers and superior technology managers. These developments will carry a high price tag. If these new kinds of educational activities are to be broadly available to Californians, they will require state financial support. And they would not be cheap. Undoubtedly, private companies would pay the freight for employees in selected categories, but these are not likely to be the individuals who most need additional education opportunity to realize career and employment growth. The established higher education systems are clearly worried that support of technology based education may come at the expense of their budgets. From the late 1960's until the mid 1990's the share of the state general budget in California devoted to UC and CSU declined from 13 percent to approximately 8 percent. Some interpret this decline in long range terms, a turning away from the historically strong support provided to higher education in California. Peltason's very important point is that if the Governor and Legislature now blithely assume that technology will increase educational productivity and reduce cost of higher education at the same time, they are incorrect. In his view, we risk eating the seed corn of the State's future economic growth.

Although rarely stated this way most information technology policy initiatives assume - at least implicitly - that human capital has replaced investment capital as the driving ingredient of the new economic age. The virtual university and connected elementary and secondary schools are at core the material that will shape the workers of the future. It will help to focus these policy initiatives to recognize that the ascendancy of human resources in economic affairs is a profoundly important development. Technology - computers/microprocessors - has created the "knowledge worker."

Knowledge workers - educated, adaptive, technologically sophisticated - are a powerful new force of economic and social energy, and nowhere is this more true than in California. Policy makers will need to think carefully about the implications of the research which shows that knowledge workers thrive on information, networking, collaboration, and are suspicious of hierarchical authority.

Information technology-based educational activity carries a high price tag with it. There are very large initial costs in infrastructure and hardware and high continuing operational and replacement costs. From my review of what other states are doing those that have been most successful in advancing their agendas - in part to ensure a sound funding base – involved all of the major stakeholders in the decision making process from the very beginning. The reason involvement is so important is not just the usual ones of building political support for an initiative. It also reflects the fact that information technology issues tend to be inherently collaborative. No single agency - not even the Governor - can effectively move forward and make information technology initiatives stick in the real world.

There are other factors operating here as well. As information technology based courses become more prevalent everywhere, over the Internet or satellite, people may not pay much attention to where the courses originated. Questions of quality assurance will arise. And with the growth of electronic media as distributors of education, "turf" issues - because of the big dollar amounts involved - will emerge within and outside the state. These are additional areas where wise policy and regulation will be required.

In a paper on public policy and information technology there are several lessons to be drawn from my discussion of the University of Phoenix in addition to the fact that it has carved out an important niche for itself in on-line degree education. The first is that there is competition out there and it will grow. Initiatives such as the WGU and the CVU are well advised to avoid the mentality that if "they build it" people will come. That may not turn out to be the case. It is important, therefore, that these ventures be closely tied to the existing university systems. The second lesson has to do with issues of quality. New technology based programs - degree and non degree - are springing up everywhere. Given the volatility of the private career school market and the fact that many students must borrow to pay the costs of this education and the potential for defrauding students, the state must consider carefully the regulatory aspects of its responsibilities.

Endnotes

1. National Information Infrastructure (NII) is designed to be "a seamless web of communications networks, computers, databases, and consumer electronics that will put vast amounts of information at users' fingertips" (Information Infrastructure Task Force, 1993) so as to meet the information needs of its citizens. It is expected to accelerate the

vast amounts of information at users' fingertips" (Information Infrastructure Task Force, 1993) so as to meet the information needs of its citizens. It is expected to accelerate the transformation of this society to the Information Age, and provide increased accessibility to a vast array of electronic information resources and services. The issue has significant implications for the use of electronic communication in education, business, industry and government.

2. From speech by Prime Minister Mahathir at Beverly Hills Hotel, Los Angeles, January 14, 1997. The Multimedia Super Corridor (MSC) is a physical area, and in the words of Prime Minister Mahathir Bin Mohamad, it is a "new paradigm for creating value in the Information Age." From "Speech by the Prime Minister," at Opening of the Multimedia Asia '96 Conference, Kuala Lumpur, August 1, 1996.

3. Governor Pete Wilson's State of the State Address, State Capitol, Sacramento, California, January 7, 1997.

4. On October 2, 1996, Governor Wilson wrote to the Western Governors Association that he would not sign the Memorandum of Understanding regarding the Western Governors University (WGU). Instead, Governor Wilson - in April 1997 - issued Executive Order W-1-153-97 in which he appointed a design team to draw up a plan for the California Virtual University.

5. *WGU News*, December 1996, Vol. 1, No. 5.

6. This description of the Western Governors University drew heavily on *WGU News*, May 1997, Vol. 2, No. 2.

7. The URL for the California Virtual University is http://www.virtualu.ca.gov

8. Executive Order W-153-97, April 4, 1997.

9. The California Virtual University is expected to offer its first courses early in 1998. *The Sacramento Bee*, October 22, 1997.

10. Office of the President News, University of California, Media Advisory, October 2, 1996.

11. Office of the Chancellor, California State University, News Release, October 2, 1996.

12. The URL for the University of Phoenix is: http:www.uophx.edu

13. Ibid.

14. AB 64 Education Technology, Chapter 8.5, Article 1, 52251 (b), Chaptered on August 19, 1997.

15. Senate Bill 994, 68th Oregon Legislative Assembly - 1995 Regular Session, Section 1(1)

16. See "Partnerships and the Evolution of the World Campus," at http://www.psu.edu/ur/GSpanier/ICDE3.html

 7. See: http://www.gov.state.ak.us/itgov/tic/planfinl.html

18. Illustrative of the rhetoric on the urgency of agency is the preamble from A 1997 report to the Chancellor of the University System of Georgia: "Georgia stands on the frontier of a new century. The environment of the 21st century will be electronic, its currency will be information and its scope will be global. It is critical to the future well being of Georgia that we develop the educational structures and programs necessary for our citizens to meet the challenges of the new century successfully." See: http://www.peachnet.edu/oiit/dlit/dlcommrep/

19. To date, fifteen governors of the Western Governors Association have signed a Memorandum of Understanding to participate in the WGU: Alaska, Arizona, Colorado, Gum, Hawaii, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, Utah, Washington, Wyoming.

20. Jack. W. Peltason, "The California Dream of Higher Education", *California Journal*, 1995, September, 28-31.