

UC AND CALIFORNIA'S FUTURES

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Members of the Commonwealth Club:

It is a pleasure to be here today in this distinguished forum. One of the founders of the Commonwealth Club, Benjamin Ide Wheeler, was a University of California president. And UC presidents have been frequent guests of the Commonwealth Club, from Robert Gordon Sproul to Clark Kerr to Jack Peltason. I'm honored to join them in discussing higher education with you.

When the Commonwealth Club asked me to speak, the title they suggested included the words "admissions" and "affirmative action"-- a tribute, no doubt, to UC's consistent success in making headlines on those two subjects in recent months. I appreciated the suggestion, of course. But I hope I won't disappoint you if I reserve discussion of those topics to the question and answer period. Not because they are unimportant--quite the contrary--but because there are so many other things going on at the University that don't make headlines and yet are crucial to California.

I chose the title "UC and California's Futures" because I believe the future of this state and the future of the University of California are inescapably bound up together. I am going to argue that UC's importance to California rests not only on its role as an educator but increasingly on its role as a discoverer of new knowledge, a point I will return to later.

The University of California today encompasses nine campuses and three Department of Energy Laboratories, five teaching hospitals, field stations and research centers up and down the state, and a library system unrivaled by any in this country except the Library of Congress. We include almost 132,000 faculty and staff and nearly 164,000 undergraduate, graduate, and professional students. There is no county in California in which people's lives are not touched by the University, because of the quite remarkable array of activities we sponsor, from agricultural extension to partnerships with industry. We are a \$10 billion dollar enterprise, an annual budget larger than that of some states.

UC is also one of the world's most distinguished universities, a status it attained with unusual speed. There are many reasons why the University of California has been a magnet for talent--California's reputation as a place of opportunity, its diverse society, even its spectacular scenery--but the principal reason has to be the consistent support of the people of California. They have believed in higher education, supported it, taken pride in it, and made the crucial difference between adequate and excellent.

As many of you know, however, the past four years have been the most difficult in the history of UC. Even in the depth of the Great Depression we did not have to struggle with budget cuts comparable to those we have experienced in recent years. Our 1993-94 budget from the State of California was the same as it was in 1987, but we have had 25 percent inflation since then and now have 8,000 more students. The University of California's budget would be about \$900 million larger today if the State had been able to provide us with funds to cover the costs of inflation and the growth in our workload. I am not talking about funds for new programs, just money to maintain the programs we already have. This \$900 million shortfall is the equivalent of the entire annual State-funded budget for three of our medium-sized campuses.

We coped with this staggering fiscal problem by cutting budgets, eliminating cost-of-living increases, more than doubling student fees, and trimming almost 5,000 jobs from our workforce. Even so, until last year the future looked bleak. Studies by both the RAND Corporation and the State Department of Finance projected a steady decline in the University's State-supported budget--possibly all the way to zero within the next five to ten years.

But then our prospects began to turn around. Last year the Governor and the Legislature approved a four-year compact with higher education that will halt the steep cuts of recent years and give us some breathing room. We are now entering a more stable period that will allow us to turn our energies from the tactics of daily survival to strategies for the future.

And the future urgently needs our attention. There is probably no institution in American society today that is not undergoing change, some of it radical change. Universities--and particularly research universities--are becoming both the source and the site of some of the most profound of these transformations. That is because they are ground zero for the discovery of new knowledge and its ultimate application. And, ironically enough, universities themselves are going to be transformed by the very knowledge they have been so instrumental in creating. Historians date the founding of the Western university back to thirteenth-century Europe. There have been few times during this 800-year history in which the ferment of change has boiled as vigorously as it does today.

So when we talk about the university of the twenty-first century, and all that it implies, we are doing much more than phrase-making. The university of the next century will be revolutionized by developments well underway right now. We know the direction of change, but not its velocity--except that it is likely to be very fast. Perhaps faster than many of our institutions can readily accommodate.

What does all of this mean for the University of California? Fortunately, despite the desperate budget years of the recent past, UC is in remarkably good shape for the next century. The quality of our faculty is still the world's best. A recent study of graduate programs by the National Research Council ranked the UC system and its individual campuses among the very best in the nation. More than half of our 229 graduate programs ranked in the top 20 in the country. Three of our campuses--Berkeley, San Diego, and Los Angeles--rank among the top twelve universities. Even more stunning is the fact that of the public universities, Berkeley ranks first, San Diego ranks second, and Los Angeles ranks third. One has to get to fourth before a non-UC institution appears--the University of Michigan.

One of the reasons we have been able to ride the recent fiscal decline so well is the high quality and the high morale of our faculty. As Clark Kerr has pointed out, in *War and Peace* Tolstoy described the Russian Army's long struggle with, and ultimate triumph over, the invading French. He attributed their success to what he calls the *x* factor--the indefinable determination to win against all odds. The University's faculty has demonstrated that indefinable *x* factor under the tremendously adverse circumstances of recent years. That has made all the difference.

UC and its faculty have established a tradition of excellence that has served us well in difficult times. But it would be hard to overstate the importance of improving faculty salaries so they are competitive with those of similar universities. What makes any university great is its faculty. Our faculty has demonstrated remarkable loyalty during these lean years, but we simply cannot ask them to do so indefinitely. This will become a major problem for the University if it is not resolved soon.

The education we offer our students is one of the best in the world, whether you are talking about undergraduate, graduate, or professional education. And we are graduating more students more quickly than at any time in our history--and much faster than most public and even some private universities.

And though we have had steep rises in student fees, we are still a bargain compared with other institutions of our quality. One-third of the fee increases have been set aside for needy students; financial aid has gone up 170 percent over the past four years. For the third year in a row UC has received a record number of freshman applications from California high school seniors. They come from all income levels, but have been greatest at the lower income levels. Four years ago, twenty-four percent of our entering class consisted of low-income students; today it is 30 percent. So we are responsive to low-income students despite the tremendous pressures that have required us to raise fees.

I'd like to turn now to the future, which will bring major challenges to UC.

First is the coming upsurge in enrollments--Tidal Wave II, as it is called. (Tidal Wave I, for the very young or for those of you with short memories, was the Baby Boom generation that made such a memorable impact on higher education in the 1960s.) Just how large will Tidal Wave II be? Estimates suggest that over 400,000 additional students will be coming into public higher education over the next decade. The California Postsecondary Education Commission, the State Department of Finance, and the University of California have all made estimates of what portion of this demand UC will be expected to accommodate, based on the Department of Finance's projections of high school graduates. All three estimates differ, but we all agree on one thing: Tidal Wave II *will* come, and it will probably hit around 2005. Our current projections indicate that from 2005 to 2010 demand for the University should grow rapidly, perhaps on the order of three to four percent a year. If that happens, we will have run out of room on our existing campuses early in the next century.

For this reason we began planning for a tenth campus in 1988. Last year The Regents approved a site in the Central Valley: Lake Yosemite, near the city of Merced. If plans unfold as we envision them, the new campus will admit its first class of students around 2005. It will bring UC into an

underserved but critically important region of the state and give us the opportunity to build a university campus for the twenty-first century from the ground up.

But there are a number of uncertainties that complicate this picture. One of them is the sheer difficulty of estimating future enrollment, because it involves so many imponderables. What are the students of 2005 or 2010 likely to choose from among the educational options available to them? Will economic conditions encourage them to stay in school or propel them into the marketplace? Since different ethnic and racial groups qualify for UC at different rates, what effect will California's increasing ethnic and racial diversity have on demand for higher education?

We must look at future enrollment in terms of our responsibilities under California's Master Plan for Higher Education. There are three especially important considerations. One is that we must choose from among the top twelve-and-one-half percent of California high school graduates. Another is that we must seek to reflect the diversity of California's population--an important but increasingly controversial responsibility. A third consideration is that we are a research university, a fundamental reality that reverberates through everything we do. The education that undergraduate students receive at a research university is different from the kind of education they would get at a liberal arts college or a community college. It should be different--the superb array of educational choices students have is one of the glories of the American system of higher education. The question in terms of enrollment is, how many students will take advantage of the special kind of education we offer?

Even if current enrollment projections turn out to be correct, a major obstacle to the tenth campus remains. What are the prospects that State funds will be there when the time comes to move from blueprint to groundbreaking?

The answer to that question is an aspect of the second challenge UC faces as we look toward the next century. I mentioned earlier that the University is in a period of fiscal stability, thanks to the commitment of the Governor and the Legislature to provide average annual increases of four percent over four years. We are grateful for this commitment. But we are also realistic enough to know that our prospects beyond the next few years are uncertain at best, deeply troubling at worst.

If the anticipated growth in enrollments does indeed materialize around 2005 to 2010, we estimate that the University of California will need a minimum increase of at least 7 percent a year in State funds if we are going to maintain our existing campuses and build a new one in the Central Valley. We currently receive average annual increases of about 4 percent. So this means that in the early years of the next century we will need to receive a greater share of the State budget than we currently do, because even with an improved economy State revenue growth is anticipated to increase at slightly less than 7 percent a year. And the Department of Finance has recently estimated that over the next 10 years the capital outlay bill for California's schools, college and university campuses, prisons, and other needs will outstrip the State's ability to pay for them by a staggering \$27 billion.

Governor Wilson and the Legislature have made UC a high priority in the current State budget. Will UC remain such a high priority that the State government will find a way to provide the funds to maintain our nine campuses and build a tenth? We cannot answer that question right now. It is one that future governors and legislatures will have to answer.

Further complicating our budgetary picture are the prospects for federal funding. UC currently receives 10 percent of all federal dollars spent on university research nationwide. Federal funding for research and development has declined in recent years, however, and is set to decline further as Congress and the President struggle to balance the national budget--perhaps by as much as 30 percent in constant dollars over the next seven years.

For research universities, this portends a fiscal earthquake that could register 9.0 on the Richter scale. The harsh reality is that, however much we may believe in it and however much we may want it, federal funding for university research is going to be less in the future than it has been in the past. Another harsh reality is that despite the success of university-based research--and it has been spectacularly successful--in these tough economic times both the public and its representatives in Congress are increasingly less willing to support the work.

There is one bright spot in this dismal picture. When quality is the factor that determines what federal research projects are funded, California does very well. So it is in California's interest that science funding in Congress be driven by peer review rather than pork-barrel politics. As long as excellence is the standard, the quality of the faculties assembled in UC will more than guarantee our success relative to other states.

Yet the fact remains that, under all scenarios, the University stands to lose a significant sum of money over the next seven years, and not just in research. Medicare/Medicaid changes will have a dramatic impact on our health sciences and the delivery of patient care at our five teaching hospitals. Cuts in federal student financial aid will also have an impact.

So two major challenges we face are a rising tide of students early in the next century and diminishing support from both the State and the federal government. Given these circumstances, how do we continue to serve California in the future as we have in the past?

There are many answers to that question. One answer is that we will need to take advantage of our strengths as a system of nine campuses. We have long recognized that the diversity of our campuses is an asset. In the future we will need to build more on the specific strengths and potential of each campus. There are some wonderful examples of that already. The University's physics departments, for example, have decided that different physics departments will have emphases in different areas. What this means is that we will be able to offer a full array of undergraduate courses in physics at each of the campuses, but at the graduate level there will be more specialization.

Another answer to the question of how we serve California is that we must develop new paths to diversity. The Regents' decision to end the use of race and ethnicity in admissions and employment changed the means but not the goal. My personal view is an optimistic one--I believe that with hard work and intense outreach efforts we will be able to maintain our

diversity. Others are more pessimistic. But virtually everyone agrees that the California of the future just won't work unless we find a way to qualify more of the state's minority and disadvantaged young people for higher education. Time doesn't permit me to describe the various activities we are involved in--from working with the K-12 schools to exploring how we can increase the eligibility rate--but we have many, and we will have more. This is a defining issue that will shape California's future in fundamental ways.

Yet another answer is that we must take advantage of the revolution in learning brought on by advances in educational technology.

The nature of the educational process has not changed much in 2500 years. The libraries of Assyria and Alexandria were much the same as libraries today. And the way learning takes place--the interaction between teacher and student--has not varied much over the past two millennia either.

But today we are moving into a dramatically different environment. This is due to the new technologies that are rapidly becoming available, within the next few years and certainly within the decade. Discoveries in the cognitive sciences about how the human mind works are converging with advances in technology to create new approaches to learning. This work is being translated directly into new developments in the curriculum at all levels of education.

There is much lively discussion of these developments at the University of California. We are asking ourselves how we, as a research university, can use technology to enrich and improve the education we give our students. Distance learning, for example, is making it possible for a course offered at Davis to include students at Santa Cruz and UCLA, and faculty from Berkeley or Princeton or indeed anywhere in the world. One experiment involves teaching classes in Russian, Japanese, and Spanish through interactive computers. Students at different locations--in this case, UC Berkeley and UC Davis--can interact with instructors, teaching assistants, and other students using software developed by one of our faculty members. Faculty on our Santa Barbara and Riverside campuses are using video teleconferencing to deliver courses in Religious Studies simultaneously on as many as five campuses. Obviously, if it is possible for campuses to pool resources this way, the potential for sharing among colleges and universities is equally great--and one step towards a solution to the problem of making higher education more available to the people of this state.

One of the most exciting possibilities we are considering is something we call the Cyberlibrary of California. This will be a "virtual" library that can be explored by all with access to the Internet. It will link together digital collections of knowledge and information, not just at UC but across the state and beyond. California's libraries, museums, and archives, public and those of academe, house compelling collections that tell of California's heritage in all its richness and diversity and that are storehouses of accumulated knowledge about science, art, engineering, history and literature. Collectively, they are among the best in the nation. Creating digital facsimiles of the most important of these collections and enlivening them with multimedia technologies opens exciting new pathways to knowledge, reference materials, and learning for citizens of all ages.

Important starts have already been made. Many of UC's libraries, museums, and archives have digitized parts of their collections and made them available on the Worldwide Web. UC Berkeley, for example, exhibits an annotated overview of photographs of California Indian basketry; UC Santa Barbara shows portions of its extensive collection of maps; and the California Museum of Photography at UC Riverside displays many of its unique collection of photographs.

But much more needs to be done. California is the nexus of developments that pave the information superhighway, developments that arise from our research and development laboratories and from the entrepreneurial energies of the private sector. We can join the talents and resources of our colleges and universities, and our public libraries, in a momentous partnership with the corporate sector to create the Cyberlibrary of California.

So far the Cyberlibrary is an idea to be realized. But it is an excellent example of how we can use the technological revolution to educate our youth and provide continuous opportunities for lifelong learning.

There are those who believe that universities that eagerly embrace the technological revolution risk making themselves obsolete. After all, if learning isn't bound to a particular campus or classroom, why couldn't other bodies fulfill the same function universities do, without all the bother of dormitories and football teams?

I believe that universities are much more likely to be transformed than eliminated. But we will need to re-envision education in terms of the new possibilities that educational technology holds out. Abraham Maslow once said that if the only tool you have is a hammer, every problem begins to look like a nail. Our challenge as institutions is to begin incorporating these new tools for learning, despite the initial disruption they may bring by forcing us to reconceptualize the problem of how we teach and do research.

Technology is relevant to the University's mission in another way. The fiscal problems California and the nation confront have their roots in our declining rate of economic growth. If you look at this century, economic growth has been running at about 3.5 percent until the early 1970s. In the last 20 years, economic growth has been about 2.5 percent. If we had had the kind of economic growth in the last 20 years that we had after World War II or earlier in the century, we would not have a deficit--in fact we would have a huge surplus.

The key to economic growth and productivity is the quality of the workforce and the application of new knowledge. They are key to the future of this country and this state. If economic growth gets back to its historical levels, we can begin to deal with the problems our society has, including supporting education for all of our citizens.

There is much interest these days in a development in economics called New Growth Theory. Simply put, the New Growth theorists argue that fifty percent of the growth of our economy in the last forty years--roughly since the end of World War II--has been due to the nation's investment in research and development. In the words of the President's Council of Economic Advisors, "Increasing the productivity of the American workforce is the key to higher living

standards and stronger economic growth in the future. Investments in research and development are the key to increasing productivity, accounting for half or more of the growth in output per person and to the creation of new products and processes."

There is another interesting aspect of the New Growth theory. When the country increases its investments in basic research, that's followed sometime later by industry's increasing its investments in applied research and development. When we cut back on basic research, it's followed by a cutback in industry's investments in research and development. There is a very simple explanation. When universities are engaged in basic research, they are generating new ideas that industry can build on, and invest in as applied research and development. When the country pulls back, then industry doesn't have that base of new ideas on which to build. Thus, the government's investment in university research is critical in driving industry's investments in research and development.

Before Sputnik in the late 1950s, universities maintained very close, collaborative efforts with industry. But when Sputnik occurred, so much money poured into university research that we lost sight of our links with industry. It is only in recent years that we have begun to again realize the importance of close links to industry in order to ensure that the ideas developed in our laboratories are put to use in the private sector. We did technology transfer rather badly for a number of years. But we are getting our house in order and are now successfully moving intellectual property into the marketplace.

There are a number of examples, but let me mention just one. The biotechnology industry was born in California during the 1970s, when a joint team of researchers from the University of California at San Francisco and Stanford University successfully spliced the first gene. Today biotechnology is a \$13 billion industry in which California leads the world. UC's nine campuses are a powerful magnet for private investment in biotechnology firms. One-third of all U.S. biotechnology companies are located in California and within 35 miles of a UC campus. One in six California biotech companies was started by UC scientists, including the three largest. And those three companies alone provide 7,000 jobs for Californians, \$283 million in State and federal income taxes, and \$3.7 billion in sales--half the U.S. biotech total.

We know we can duplicate this success story in other sectors of our economy. If we are going to help California stay at the economic forefront, however, there is one overriding principle that is fundamental. The University of California must remain a research university of the highest quality.

It has been unpopular in the United States in recent years to talk about research universities and the role of research in our universities. It has often been said that if only universities would stop doing research and focus on teaching, the problems of higher education would be solved. But in my judgment, the role of the University of California's research is comparable--and I use the term comparable without hesitation--to its role in the education of young people.

Obviously, I want the education we provide young people to be the very best in the world. But I also want to see that research at the University of California continues to be vigorous and vital.

And that involves ensuring that the ideas developed in the University are transferred into the industrial, private sector.

There are many possible futures for California. Some are bright, others are not, depending on the choices we make. But one fact is indisputable. The great success of the state of California in this century has been very much linked to the quality of its universities. This is true whether one considers the remarkable caliber of our graduates or the extraordinary quality of our research. My job as president--with your help and the help of all the people of this state--is to see that the University of California remains one of the world's great universities and California's greatest asset in creating its future.