Several years ago, I gave a lecture at the Berkeley campus in a colloquium series on the history of science and technology. My talk was titled "The Golden Fleece, Science Education, and U.S. Science Policy" and was an account of my five years at the National Science Foundation. The talk was recorded and subsequently transcribed. The edited transcript was placed on my Web site (www.ucop.edu). I received many comments, including some from individuals who had participated in the events described in the paper. The editor of the Proceedings of the American Philosophical Society suggested that he publish the paper, and I readily agreed.

Given that experience, I have now decided to dictate an account of my years as the chancellor of the University of California, San Diego (UCSD) and as president of the University of California System. I have chosen to title these remarks "20/20." I started as chancellor of UCSD on July 1, 1980, and became president of the University of California System on October 1, 1995, and now am a few weeks short of having served for 20 years in those two positions. The period in question is indeed the last 20 years of the 20th century--hence the title for these reflections.

This account will focus on personal experiences and anecdotes rather than on a careful analysis of the period. Possibly at some later time I'll take a more analytic view of my period as chancellor and president. For those interested in other aspects of my life, there are several accounts. When I received the Distinguished Scientific Contribution Award from the American Psychological Association, an account of my career was published in American Psychologist.\textsuperscript{2} When I was elected president of the American Association for the Advancement of Science, another account, written by Bill McGill, the former president of Columbia University, appeared in Science.\textsuperscript{3} I have written briefly about my years at Stanford University in the preface to a book entitled On Human Memory: Evolution, Progress, and Reflections on the 30\textsuperscript{th} Anniversary of the Atkinson-Schiffrin Model.\textsuperscript{4} Yet another reference is the book by Nancy Anderson entitled An Improbable Venture,\textsuperscript{5} covering the history of UCSD.

My account of these 20 years will not follow a strict chronological sequence, but rather will focus on a list of topics that reflects my perspective on life as a chancellor and president.


\textsuperscript{4}Chizuko Izawa, ed., On Human Memory: Evolution, Progress, and Reflections on the 30\textsuperscript{th} Anniversary of the Atkinson-Schiffrin Model (Lawrence Erlbaum Associates, 1999).

\textsuperscript{5}Nancy Scott Anderson, An Improbable Venture (UCSD Press, 1993).
Appointment as Chancellor

Many universities, when searching for a president, turn naturally to the director of the National Science Foundation (NSF). As director, I had a steady stream of inquiries from universities, but had no desire to be a university president. My intention was to complete my term at NSF and then return to Stanford and reestablish my teaching and research programs. However, I did engage in a discussion with the search committee of Brown University in the spring of 1976 and was offered the presidency. Never reach the point of receiving an offer unless you are prepared to accept it. In this case, matters moved too quickly and my wife, Rita, and I were caught by surprise. Our daughter was a freshman at Brown University and I doubt that she would have appreciated my becoming president. Moreover, I had been at NSF only a short time, and it was simply too soon to leave. Rita and I never regretted our decision to turn the offer down.

I was also interviewed by the trustees of the University of Southern California (USC). I won’t give an account of that presidential search except to refer the reader to a stream of articles that appeared in the *Los Angeles Times* in January of 1980, providing details of the search, including my name and the name of the other candidate. It was a thoroughly botched search. I withdrew and so did the other individual. Fortunately, USC was able to regroup and several months later succeeded in appointing a president. If the *Los Angeles Times* is to be believed, a faculty group led by the dean of engineering was adamant in supporting my candidacy, but several of the trustees believed that I was too radical for USC. One
of the trustees was a former director of the CIA and was quoted in the *Los Angeles Times* as saying that he had the agency investigate my background and uncovered the fact I had a close working relationship with Ted Kennedy and other members of the Kennedy family. The implication was that I might be a subversive. Again, it was a mistake to have let the search process go as far as it did, but there were some attractions about USC that caused me to delay too long in withdrawing.

The events at USC occurred in the early months of 1980. When they were over, I had had my fill of presidential searches. David Saxon, president of the UC System, had scheduled an appointment with me at the National Science Foundation. I assumed the physics community had unleashed him on me because they were unhappy with the funding NSF was providing for a new accelerator. To my surprise, he arrived with a University of California Regent in tow and was unaware of the accelerator issue. Rather, he asked whether I was interested in being considered for the chancellorship of UCSD. My immediate response was that I was not interested in participating in another search so soon after the publicity regarding USC. He then asked if I'd be willing to meet with the search committee on a completely confidential basis if they were down to a short list of three candidates. I responded that, under those conditions, I would consider the matter if Rita was agreeable. A week later, on a Wednesday, Saxon called and indicated that they were down to a list of three and invited me to meet with the search committee at the Los Angeles Airport the following Sunday. He assured me that the meeting would be kept secret and that no visit to the campus would be expected.
Rita liked the idea of UCSD. Our daughter had spent the summer of 1975 working in the neurophysiology laboratory of Ted Bullock at Scripps Institution of Oceanography (SIO). The three of us were enamored of the La Jolla area. Further, UCSD was a major recipient of NSF funds, in large part because of the deep-sea drilling program run out of SIO. I knew many faculty from the University, including Bill Nierenberg, the director of SIO, who also was a member of the National Science Board (the presidentially appointed oversight board of NSF). Finally, the outgoing chancellor, Bill McElroy, had been the third director of NSF and over the years we had been in frequent contact.

So on Saturday I flew to Los Angeles, telling no one but Rita where I was going. The secretary of the UC Regents was equally discreet in ensuring that no one in California learned of my visit. The meeting with The Regents was at a hotel near the Los Angeles Airport scheduled for 12 o'clock on Sunday. That morning I went for a long run and on my return to the hotel encountered Bob Adams, who was out for a morning walk. Bob was the provost at the University of Chicago and later went on to become the secretary of the Smithsonian Institution in Washington, D.C.; I am pleased to say that he is now retired at UCSD as an adjunct professor in the anthropology department. After exchanging greetings, we asked each other why we were in Los Angeles. Bob told me he was meeting with the UCSD search committee at 9 o'clock and I told him I would be meeting with the committee at 12 o'clock. We were both surprised and I went away thinking that the search committee had shown very good taste indeed. Bob is someone whom I admire—he has had a brilliant career both as a scientist and administrator.
After my interview, I had dinner and returned to my room. Shortly thereafter, I received a phone call from David Saxon offering me the chancellorship. I told him that I wanted to talk with Rita, but that I would be in touch with him before the evening was out. After a lengthy phone conversation, Rita and I both agreed that I should accept the position. By Monday, I had coordinated my resignation as director of the NSF with the White House. The UCSD campus and the Office of the President made the announcement a few days later.

Early Period as Chancellor

Rita and I moved to La Jolla on July 1, 1980, and were once again overwhelmed with the beauty of the area. But matters at the campus were less tranquil than the scenery. During the preceding year, there had been a nasty battle on the campus between Paul Saltman, vice chancellor for academic affairs, and Bud Sisco, vice chancellor for administration. Essentially, it was an argument over whether the principal authority for UCSD research programs should fall in Paul Saltman's area or be transferred elsewhere. Bill McElroy, who was the chancellor, sided with Bud Sisco and soon the matter seriously divided the faculty. A debate at a faculty senate meeting led to an informal vote of no confidence in the chancellor. That, in turn, was followed by a mail-ballot vote and the chancellor's resignation.

Bill McElroy was a distinguished biologist, a member of the National Academy of Sciences, and an effective director of the NSF. He was one of the individuals whose research helped set the stage for the revolution in biology that occurred in the second half of the last century. Bud Sisco had come to UCSD from
NSF with Bill McElroy, having been a senior administrator at NASA prior to his
service at NSF. Bill had great confidence in Bud Sisco. However, at NSF and at
UCSD, Sisco demonstrated poor judgment on issues related to faculty matters. Bill
should have detected the emerging problem much earlier, but in the 1970s he had
personal difficulties and was not as alert to University issues as he should have
been. I had a high regard for Bill and felt very sorry for what happened to him as
 chancellor. We kept in close touch with each other until his death a few years ago.

One aspect of the vote of no confidence by the Academic Senate still disturbs
me. When Bill realized that he had serious problems with the faculty, he went to
the leadership of the Senate and told them he would be tendering his resignation
the following week, effective July 1, 1980. But the senate leadership disregarded
his plea and pressed forward on the mail-ballot. The vote was unnecessary and
created a great deal of turmoil, not only at the University but in the greater San
Diego community, where Bill was highly regarded, especially because of his efforts
to heal some of the wounds of the Vietnam War period.

During that period, the relationship between UCSD and the San Diego
community had been testy, to say the least. The city of San Diego was still a Navy
town, very conservative and inclined to view UCSD as a hotbed of radicals. Bill
McGill, who was chancellor of UCSD from 1968 to 1970, describes the situation
quite well in his book *Year of the Monkey*. Bill McElroy, McGill’s successor as
chancellor, had worked hard to build bridges to the community and his efforts were

much appreciated. The community leaders were outraged when the faculty called for his resignation, and, among other things, published several full-page ads supporting Bill.

Accordingly, as the incoming chancellor, I had two immediate responsibilities—to restore faculty confidence in the UCSD administration and to rebuild town-gown relations. I am reminded of a story about each.

I was scheduled to visit all academic departments in my first few weeks at UCSD to exchange ideas and meet with the faculty. These visits proved to be important in building relationships with the faculty and understanding the institution. But there were some contentious moments. One occasion stands out in my memory. I was with the literature faculty and we were engaged in a discussion about the nature of a liberal education. Having been an undergraduate at the University of Chicago, I had views on the topic that didn’t please several members of the literature faculty. That discussion ended with one faculty member, who later became a good friend, simply announcing, “Well, we got rid of one chancellor. If we have to, we can get rid of another.” I had only been there a few weeks.

The other story relates to town-gown relationships. I had been chancellor for less than a year when I was visited by a society matron who was the chairperson of the San Diego commission on the bicentennial of the American constitution. Each city had its own committee charged with planning events and celebrations for the bicentennial. She came to my office and with me during her visit was a member of our history department. We talked about the bicentennial and then my colleague in history and I proceeded to describe what the University was planning for the
bicentennial celebration. She was impressed and at the end of the meeting finally asked if she could speak to me privately. She indicated that her committee had recommended that she not raise this subject with me since nothing would come of it; but because I had been so forthcoming, she decided to overlook her committee's advice. I urged her to tell me what she had on her mind. She said, "I know it's policy that the University will not fly the American flag on campus, but I was wondering if during the bicentennial you would possibly be willing to fly it, nevertheless." I was stunned, walked her to the window, and pointed to a flag pole flying the American flag. I said it had flown there every day since the University was established. She was surprised but still had some lingering doubts. During the Vietnam War, some students had threatened to take the flag down, and several groups in San Diego continued to elaborate on that story as though it were indeed fact. After that I decided to install a flag at every major entrance to the UCSD campus. Not long thereafter, I invited a Marine Corps general with his Marine Corps color guard to raise the American flag at the dedication of a new facility, and I made sure we got good press and TV coverage.

Goals and Faculty Quality

When starting as a new president or chancellor, it's important to establish goals and to announce them widely. The goals help guide day-to-day decisions, but they also give the faculty and the larger university community a clear sense of the direction in which you would like to see the university move. (Note that I did not
say "The direction in which I would lead the university." Faculty do not respond warmly to the idea of being led by the chancellor.)

The archives have my inaugural speech as chancellor with goals stated for the institution. As president of the UC System, I again stated goals; these goals are listed on my Web site. And this very week, I am preparing a report to The Regents restating my initial goals and the progress that has been made during the last five years.

I won't review my goals as chancellor or as president; they are a matter of record. However, one goal heads both lists, namely, recruiting and retaining excellent faculty--world-class leaders in their fields of research and scholarship. If one has a truly excellent faculty, then all else follows. Stated in the language of the logician, an excellent faculty is a "necessary and sufficient condition" for a great university. When I say "sufficient" I may be overstating the case, because a strong library, laboratory facilities, excellent students, and meaningful curricula are also needed. Nevertheless, I like to take the hard form of the assertion "necessary and sufficient" when it comes to emphasizing the critical role of the faculty.

The founding faculty at UCSD were people at the forefront of their disciplines and a culture soon emerged that gave faculty pride of place. As chancellor, my goal was to see that this culture was maintained and that outstanding people were recruited to the faculty. The culture of an institution is a powerful motivator; it can give individual faculty confidence in the significance of their work and ensure that new hires quickly adapt to that culture.

On the topic of faculty recruiting I am reminded of Fred Terman, who played a key role in the development of Stanford University in the years after World War II. Fred had a bagfull of tricks for recruiting. One that I found useful involved election to the National Academy of Sciences. Each year the election process yields a rank-ordered list of individuals. About a hundred individuals are on the list and 40 are elected in a given year; the remainder have an excellent chance of election in subsequent years. Terman would look at the list just below the 40 cut-point and pick a few of the best to recruit to Stanford University. In those days, the recruitment process moved quickly. A Terman recruit’s appointment to the Stanford faculty would soon be followed by election to the National Academy of Sciences.

A Liberal Education

Having been imprinted as a college student at the University of Chicago, I have a strong commitment to the concept of a liberal education. The college of the University of Chicago, in the 1940s when I was a student, did a superb job with a curriculum that balanced study in mathematics and science with equally diligent study in the humanities and the social sciences. The keystone idea in my mind is that a liberal education involves both the sciences and the humanities. One without the other is not adequate to qualify for the title “liberal education.”

At times I do battle with an occasional humanist who regards the sciences as a diversion from a true liberal education. My early experience in these debates occurred at the University of Chicago in a marvelous course entitled “Observation, Interpretation, Integration” (OII). I was fortunate to be in a group of students that
was jointly taught by none other than Maynard Hutchins and Mortimer Adler. Hutchins was president of the University of Chicago, and he and Adler had developed the idea of the hundred great books. Although the Chicago curriculum did indeed have an emphasis on the hundred great books, it also provided a solid background in the sciences.

Despite that curricular balance, it's fair to say that neither Hutchins nor Adler had the slightest exposure to modern science, unless one wanted to claim that knowledge of Freud's work qualified in this regard. Included in my class of students was Allan Bloom, who later became famous with the publication of *The Closing of the American Mind* in 1987. Allan was a fascinating individual who was made memorable by Saul Bellow in his novel *Ravelstein*—a memoir-like account of Bellow's friendship with Bloom. Bloom, Hutchins, and Adler saw eye-to-eye on every issue. Early in the course, we were engaged in a lively discussion about the nature of a liberal education. Everyone, myself included, agreed on the importance of the great Greek philosophers and the University of Chicago's list of a hundred great books. But I quickly got into deep trouble when I advocated that the calculus was also a prerequisite for a liberal education. Hutchins and Adler disagreed, and the entire class stood in disbelief that I would offer such a heretical view. I remember Allan Bloom being particularly vocal in condemning my position, and we remained antagonists for the rest of the course. I never quite recovered from that experience and it still occasionally recurs in my dreams. Some 20 years later, I chatted with Adler at a social event in San Francisco. I reminded him of the class
and he remembered our debate very well. He had not changed his mind and indeed I had not changed mine.

These comments about the University of Chicago bring to mind a special connection between Chicago and UCSD. In its founding period in the late 1950s and early 1960s, UCSD had great success in recruiting faculty from the University of Chicago. The numbers recruited were so large that it surely was an embarrassment to Chicago, but what better place to recruit faculty? Harold Urey, a Nobel Laureate, was one of the first recruits on a long list that included several younger faculty who were students at Chicago with me and are still at UCSD, although retired. One husband-and-wife team was a special catch. Joe Mayer was a physical chemist and his wife, Maria Mayer, was a physicist. Joe was a faculty member at Chicago, but the university would not give his wife a faculty position because of its nepotism policy. UCSD offered both of them faculty positions and they arrived in the fall of 1960. In 1963, Maria Mayer was awarded the Nobel prize in physics, the second woman in history to win a Nobel prize. San Diego was not the most sophisticated of cities in those days, and the local newspaper headline read “La Jolla Housewife Wins Nobel Prize.”

Administrative Style

When I arrived at UCSD, it was necessary to make a number of changes in senior administrative positions. One of my strengths as an administrator is that I move quickly on personnel issues. By the mid-1980s the administration of UCSD
was regarded as one of the best in the UC system. Some of the new administrators were recruited from other institutions, some from within UCSD. In the process, I managed to persuade several people whom I had inherited to seek jobs elsewhere.

A careful examination of my record at NSF, at UCSD, and at the Office of the President will show considerable turnover in key positions at the start of my administration. I believe in making changes quickly when they are needed. But in letting someone go I have always tried to arrange things so that the individual could leave with dignity and with the departure being viewed by others as a decision made by the individual in his or her own best interest.

The faculty and the Office of the Chancellor had a very constructive relationship during my time at UCSD. I established a full-time position of “Associate to the Chancellor,” which was filled—usually for a term of one to three years—by a series of senior faculty members who participated in all activities of the Office of the Chancellor, ensuring that the faculty’s views were well represented. I also had regular meetings with the chairman of the Academic Senate and invited him or her to attend on a regular basis the Monday morning meetings of the chancellor’s council.

When I became president, I extended the same invitation to the chairman of the statewide Academic Senate, namely to participate in the Monday morning meetings of the senior officials of the University of California. I have always believed in shared governance and the importance of faculty involvement in decision-making. That doesn’t mean that decisions cannot be made in a timely manner or that all decisions will be supported by the faculty. It does mean that the
faculty will have a clear understanding of how administrative decisions are made and the opportunity to make their views known during the decision-making process.

I am reminded of an occasion in which I was in sharp conflict with the UCSD faculty and did not follow their advice. It involved the construction of Library Walk, a project that required cutting down a large number of trees. A group of faculty was violently opposed to the project, even though earlier the faculty senate had approved a master plan for the campus with the walk as a centerpiece and the addition of many more trees than were to be cut down. Students soon joined in the melee and placed white crosses on the trees—a stunning sight to behold. I proceeded with the project nonetheless and had to have several students and one faculty member removed who had chained themselves to the trees. With the passage of time, the walk has become one of the most attractive areas of the campus. Cutting down trees—whether one or many—is always hazardous for a chancellor or a president.

Community Issues

The interaction between UCSD and the San Diego community while I was chancellor is well documented in Nancy Anderson's history of UCSD. Another account is presented in a recent report by the U.S. Small Business Administration entitled Developing High-Technology Communities: San Diego. A section of that report is reproduced on the next several pages.

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V. THE UNIVERSITY-INDUSTRY CONNECTION

THE UNIVERSITY OF CALIFORNIA AT SAN DIEGO (UCSD)

The Critical Role of UCSD’s Chancellor

Industry-university cooperation enriches the university. In San Diego, UCSD took the lead in creating a more favorable environment for building knowledge-based businesses. As businesses built up, the University benefitted from the technology people (that the businesses) attracted.

- Richard Atkinson, President, University of California

Dr. Richard Atkinson, President of the University of California, was the Chancellor of UCSD from 1980 to 1995. Dr. Atkinson played an important leadership role in promoting high-technology development in the San Diego region. As Chancellor, he set the tone and direction for the University, encouraging cooperation with industry, which helped the region’s defense industries diversify and helped small, high-technology enterprises get started.

At UCSD, Dr. Atkinson actively involved local industries in recruiting science and technology "stars" and endowing chairs at the University. In fact, the campus recruited faculty of such stellar quality in virtually all disciplines that, despite the need to add positions quickly to keep pace with an increasing enrollment, by 1995, a National Research Council study ranked UCSD tenth in the nation in the quality of its graduate programs. The excellence of the faculty, and of the research the faculty produced, increased the credibility and visibility of the University in the community, state, and nation, and was a major factor in UCSD’s success in contributing to the San Diego economy.

Dr. Atkinson’s strategy included establishing a new school of engineering, whose principal advocate and architect he became as soon as he arrived on campus. The school has grown in size and distinction over the past 10 to 15 years, and one of its first faculty members, Irwin Jacobs, went on to found QUALCOMM. Under Dr. Atkinson’s leadership, the campus successfully bid for one of five national Supercomputer Centers and aggressively sought and attracted research funding in science and engineering, making UCSD one of the top five university recipients of federal research funding during most of his tenure.
Dr. Atkinson encouraged collaborative research with industry by establishing technology transfer programs in science and engineering departments and saw that UCSD mounted a vigorous campaign to attract industrial consortia — the Microelectronics and Computer Corporation (MCC) and Sematech — to San Diego. Although both eventually located in Austin, Texas, San Diego was the only city in California to be a finalist. He engaged the University Extension in developing corporate executive programs, and later, working with community and private sector leaders, promoted networking activities for high-technology business and industry. The networking activities became a more formalized program — CONNECT — which has grown into an impressive program aimed at networking, advocacy, assistance to and promotion of technology firms. Dr. Atkinson charged Dr. Mary Walshok, Dean of Extended Studies and Public Program, with developing the corporate programs including CONNECT, and subsequently recruited a well-respected business leader, William Otterson, to direct the program. The CONNECT program and the San Diego Computer Center are described in the next section.
INTERVIEW WITH DR. RICHARD C. ATKINSON,  
PRESIDENT, UNIVERSITY OF CALIFORNIA

In September 1998, Innovation Associates' President met with Dr. Richard Atkinson to discuss his philosophies on the role of the university in stimulating high-technology economies. The following is derived from that meeting.

Dr. Atkinson's philosophies on university-industry cooperation are rooted in his experiences as a professor at Stanford University. At Stanford, he witnessed Dr. Fred Terman, Dean of Engineering, actively encouraging university-industry cooperation and promoting spin-offs of high-technology industries from the University. Dr. Atkinson carried this philosophy with him to the National Science Foundation (NSF), where, as Director, he began to build bridges between universities and industries. At the NSF, Dr. Atkinson started the Industry-University Cooperative Research Program (IUCRP), which required university R&D projects funded by the IUCRP to involve industrial partners. In the late 1970's, Dr. Atkinson promoted the idea of university-industry cooperation at the NSF when there was not much interest in this type of cooperation. At first, the idea of requiring industries to partner with universities to receive grants met with opposition, but eventually the concept became accepted and institutionalized. Dr. Atkinson promoted the importance of university R&D and the role of university-industry collaboration at the NSF:

- By initiating formal analysis to measure the economic results of R&D investments;
- By promoting technology transfer policies aimed at moving intellectual property rights from government to universities (which later was mandated through the Bayh-Dole Act);
- By institutionalizing engineering as an integral part of NSF activities, and underscoring the relationship between science and engineering; and
- By encouraging university-industry relationships in R&D through the IUCRP.
Dr. Atkinson said that, prior to the “Sputnik era,” universities and industries had strong relationships in science and engineering. Universities cooperated with industries because it was economically beneficial for them to do so. But the bonds between universities and industries weakened during the Cold War when the federal government provided extensive funding for university research, lessening the need for university-industry cooperation. As the “Sputnik era” was coming to an end, Dr. Atkinson believed it was time to renew the once strong relationships between universities and industries. The IUCRP, and other activities that stemmed from Dr. Atkinson’s tenure at the NSF, laid the groundwork for national policy and provided a model for state technology programs. Programs such as the Ben Franklin Program in Pennsylvania, and the Thomas Edison Program in Ohio, followed NSF’s lead by focusing resources on university-industry collaboration in R&D and university-centered technology transfer.

As Chancellor of UCSD from 1980 to 1995, Dr. Atkinson drew on his Stanford and NSF experiences to position UCSD as a key technology generator in the San Diego region. During his tenure, the University played a central role in creating an entrepreneurial climate by attracting federal research dollars and helping bring research to market. Dr. Atkinson believed that it was part of the University’s mission, as a state-funded institution, to give something back to California by creating a more favorable environment for attracting and developing technology-based industries around the University and in the community.

Dr. Atkinson promoted his ideas of university-industry collaboration at a critical time in San Diego’s economic development. In the late 1980’s and early 1990’s, when the region experienced defense cutbacks, Dr. Atkinson worked externally, with community organizations, and internally, with the University’s department heads, to forge a relationship between the University, the community, and the private sector. He believed that it was natural that small, high-technology enterprises would fill the gap left from reductions in defense contracts to major corporations.

In order to promote the development of high-technology enterprises in the San Diego region, Dr. Atkinson’s initiatives at UCSD aimed:

- To increase the University’s basic and interdisciplinary research capacity,
- To increase the University’s computer and engineering education and research through new schools and centers,
- To encourage the transfer of the University’s technologies to the private sector and into the market place,
- To support the development of new technology enterprises, and
- To develop national credibility and visibility for the University and the region’s technology community.
Dr. Atkinson believed research was the key to economic progress, and that university-industry collaboration was essential to transfer research into the market place. Citing principals set out by President Truman’s Science Advisor almost 50 years ago, Dr. Atkinson said that (1) basic research should be funded by the federal government, (2) basic research should be carried out in research universities, and (3) funding should be made available to individuals not institutions. Dr. Atkinson’s active pursuit and success in obtaining federal funding for research, and his active courtship of private funding, were prerequisites to building UCSD as a nationally prominent research university.

Dr. Atkinson believed in greater freedom for academics to carry out their own research programs. He also believed horizontal, non-hierarchal structures encouraged “academic entrepreneurs.” Under Dr. Atkinson’s direction, UCSD professors were expected to spend about half of their time conducting research. Dr. Atkinson said, despite the emphasis on research, that teaching quality remained high. This was demonstrated by consistently high satisfaction ratings from undergraduate students.

Industries, he said, primarily want two things from research universities: access to students, and a window on science and technology. In San Diego, Dr. Atkinson helped provide the window on science and technology by instituting university-industry cooperative programs, executive fora, and programs that networked high-technology firms in the region.

Dr. Atkinson believed, although direct technology transfer to industries was important, perhaps even more important was the indirect technology transfer which resulted from students taking jobs with local industries and starting businesses. This indirect technology transfer benefitted growing local industries as well as the University’s ability to attract top students.

Dr. Atkinson stressed the difference between the university being an “engine that drives the economy” and a “job shop.” As an “engine,” the university provides technology firms with research and development and technology transfer. Moreover, Dr. Atkinson said that not every university should be engaged in research, for different universities serve different purposes in the community and the state.

Dr. Atkinson believed the most important asset for any university was to employ the best people. He actively involved the private sector in recruiting top national scientists and engineers to the San Diego region. He said, “you cannot create intellectual talent, you must go after it and reduce the constraints in attracting the best people.” He contended that a public university is presented with greater challenges than a private university in attracting the best people, but that this could be overcome, in part, by involving the private sector.
In terms of the national economy, Dr. Atkinson said that the application of knowledge may be (the United States') best strategic advantage in an international market. In order to apply knowledge and increase the U.S. competitive position, he believes two factors are key: (1) increasing productivity of the American workforce, and (2) increasing investments in research and development (which ultimately leads to increased productivity). He referred to a report by the Council of Economic Advisors which stated that 50 percent of all U.S. economic growth in the past 50 years has been due to investments in research and development (R&D). He said that research universities have been, and continue to be, a valuable source of that R&D. Dr. Atkinson expressed concern about declining federal R&D funding to research universities, and suggested that this could weaken future economic growth.

In 1995, Dr. Atkinson assumed the Presidency of the University of California, where he is applying experiences from Stanford University, the National Science Foundation, and the University of California at San Diego. He has already increased the University of California's university-industry efforts in biotechnology, and is expanding that collaboration to other fields. If the State of California benefits from Dr. Atkinson's leadership, as San Diego has benefitted, the State is indeed fortunate to have him at the helm of its university system.
Association of American Universities

After becoming chancellor, one of my first efforts was to lobby for UCSD’s election to the Association of American Universities (AAU). The AAU is a group of distinguished research universities and membership is by election. The AAU includes the expected cast of schools: the Ivy League universities (except for Dartmouth), the Big Ten schools, the University of Chicago, Stanford University, MIT, the University of Washington, and so forth. UC was a founding member of the AAU at the turn of the last century; after the UC System was established, the Berkeley campus took on the mantle of AAU membership. UCLA was not elected until 1972, an election long overdue. UCLA’s election was the first time that any university system had more than one campus as a member of the AAU.

As chancellor I began a correspondence with friends who were presidents of AAU universities, making the case for UCSD in terms of the excellence of its faculty, its research and teaching programs, the level of federal R & D support, etc. A strong group of supporters emerged among the AAU members and the UCSD case was presented to the AAU selection committee in 1982. No institution had been admitted to the Association since UCLA in 1972 and resistance to enlarging the membership was considerable. Many AAU members also believed that an equal balance should be maintained between private and public universities. But the case for UCSD was extremely strong and a favorable decision occurred with the election of one public institution and one private institution: UCSD and Rice University. I believe my campaign with AAU presidents was critical to moving the election process forward; Rice University was a beneficiary.
I was pleased that during my second year as president of the UC System, UC Santa Barbara was elected to the AAU followed, a year later, by UC Davis and UC Irvine. I campaigned for their election and it's a mark of the University of California's overall distinction that it is still the only system with more than one campus represented in the AAU. No one can doubt the great distinction of UC Berkeley. But many people, particularly in the eastern U.S., do not recognize the breadth and depth of quality throughout the UC System. For example, in the year 1999 federal R & D funds going to the University of California System were greater than those for the entire Big Ten (which has 11 medical schools compared to our five) and greater than the entire Ivy League. Every school in the UC System deserves the title "research university."

Leadership

By no plan but by serendipity, I've been involved in research on leadership for much of my adult life. While serving in the U.S. Army in the early 1950s, I was assigned to an organization called HumRRO (Human Resources Research Organization) located at Fort Ord, California. One of the research projects I worked on involved identifying the leadership characteristics of effective junior officers. During my Army service, I published several papers on leadership. And in the 1980s, I served on the Board of Directors of the Center for Creative Leadership, headquartered in North Carolina. The center was involved in research and training

-23-
programs on leadership for various types of organizations ranging from large corporations to national, state, and local government agencies. With that background and a survey of the recent literature, I believe I would be qualified to write a review article on research findings dealing with principles of leadership. But I have no such inclination. Clearly, talented people focused on the problems of leadership have useful observations and anecdotes to contribute; however, the research that's been done to date--based principally on correlational analyses--has not led to meaningful scientific advances.

MBA programs have courses in leadership and most corporations provide their executives with seminars on leadership. Obviously, many people believe they gain a great deal from these courses and seminars, but they are not based on scientific evidence. Rather, it's a collection of anecdotes and observations about what good leaders seem to do. The same observations were made by the Greeks and Romans many centuries ago. Indeed, the Greek biographer, Plutarch, in his study of famous leaders of antiquity, offers an analysis of leadership as sophisticated as any available today. It has been a disappointment to me that research in this area has not led to significant advances; hopefully, in the future, the situation will change. Thus, my comments on leadership are nothing more than intuitions based on my experiences. I have not served as a president of a major corporation or led an army in the field, and my views may be of no value in those circumstances. They may have some relevance for university administrators, however.
My perspective on leadership is reflected in a poem by Lao Tzu, a 6th century B.C. Chinese philosopher. The poem reads as follows:

He does not make a show of himself
Hence he shines
Does not justify himself
Hence he is glorified
Does not boast of his ability
Hence he gets his credit
Does not brandish his success
Hence he endures
Does not compete with anyone
Hence no one can compete with him.

I have already discussed the importance of establishing goals early in one's tenure as a president and making those goals visible to the university community. Another feature of leadership is being forthright and direct in all dealings, whether with faculty, students, staff, alumni, or friends of the university. It is important to establish a reputation as someone who can be trusted and relied upon to follow through on commitments. Once that trust is broken, it's near impossible to restore.

It is also important to give people who work for you full credit for their ideas and contributions. I've always gone to an extreme, both privately and publicly, to recognize individuals who've had good ideas or made special contributions. By doing so, you help ensure their loyalty but also send a message to the broader community that creativity is encouraged and rewarded. Some people in leadership positions have difficulty giving credit to others; in the long run, nothing is more damaging to their reputation.

I also believe in making decisions quickly--decisions that sit on a president's desk too long send out a message that a leader is indecisive. And indecision at the
top is contagious throughout the organization. In dealing with people who work for you, encourage them to act promptly, even if on occasion they are wrong and have to reverse course later. In a university environment, there is a tendency to check with every constituency several times, often without being precise about the possible alternatives from which one must choose a course of action. Formulate the options clearly and then push for agreement. If agreement is not possible, then presidents and chancellors need to act on their own, recognizing that they will not always have the full support of every constituency.

It’s important to establish an environment on the campus where the chancellor is available and readily approachable. Be visible, take frequent walks on the campus, and drop in on people unexpectedly as a way of showing interest in their work. This is particularly important in the first few months as a new president or chancellor. Once you have established the image of being available and approachable, that image will endure even though your responsibilities may prevent you from sustaining that initial level of public visibility.

The job of chancellor places one in a special position. I will never forget an experience I had in my first weeks as chancellor. I went shopping one evening with my wife. She was at a counter making a purchase and I was standing off to the side. When she’d made her decision, I came over and offered my credit card to the young woman who was clerking at the counter. She was a UCSD student. When she looked at the credit card and saw my name, her response was, “You’re the chancellor! I never knew chancellors went shopping!” It’s a bizarre comment, but it reflects a certain attitude toward the position of chancellor.
Let me now skip quickly through a series of bullets in no particular order:

• Never misrepresent facts. You will be brought to task sooner or later. Faculty and students are too bright to be deceived over the long run.

• When fundraising, be convinced that the project you're trying to raise money for is worthwhile. When that’s the case, never hesitate to ask a potential donor for support. Some presidents have great difficulty making the final pitch and let subordinates do the job. That’s a missed opportunity. If it’s an important project, then it is the president’s responsibility to convince the donor of its value.

• Be careful about funds that are available for your personal use. Never use university dollars to support your own research or to benefit yourself in any way. Always assume that your expenditures will be scrutinized by many people, some looking to find fault. Be sure that there is no question that the funds are being used appropriately and that their uses can withstand public review.

• Be very careful about publicly criticizing anyone, particularly faculty. No matter how outrageous or unjustified a faculty member’s remarks, try to be reserved in your response. If you attack—even though you are justified—other faculty will worry that you might turn on them in the same way.

• When you fire someone working for you, keep it confidential. Relieve them of their position in such a way that publicly it is viewed as a decision that they themselves have made and have made in their own best interest. The individual should be permitted to resign with dignity. With care, this can be done successfully, even in cases where the individual is difficult to deal with.
• Know the university budget in detail. It is a mistake to let someone else control the purse strings.

• Make a habit of writing to individual faculty and staff recognizing their successes or special contributions. These can be very brief notes—a few sentences—but they will be greatly appreciated.

• When a newspaper publishes a story that is unfair and misrepresents the facts, think carefully about whether or not to respond. Newspapers rarely if ever retract a story, and a counterattack by a chancellor or president will intensify the matter. Stories of this type tend to be quickly forgotten and are usually best ignored. If you feel that a response is absolutely necessary, it is better for someone else to write a letter-to-the-editor that is strictly factual and does not impugn the integrity of the reporter or newspaper.

• Avoid engaging in any kind of activity on or off the campus that will not withstand public scrutiny. You can be away from the campus and think that no one knows you, but in all probability someone will recognize you. For example, when you’re driving your car, don’t engage in maneuvers that other drivers will regard as discourteous or reckless. Those other drivers may turn out to be staff or faculty and they will be quick to tell others.

• This comes late in the list, but to be a successful president or chancellor, one must have had the experience of engaging in serious scholarly work. Someone who has never been involved in intellectual pursuits will have difficulty gaining the respect of the faculty. Unfortunately, faculty search committees sometimes go astray and push for a president who is not intellectually competent, feeling
that they can dominate the person. That's a problem trustees and regents have to guard against in selecting a president.

- Every statement you make, whether in private or public, probably will be quoted and often distorted, so be careful what you say even to friends. When a chancellor or president speaks, the world listens.

- Public speeches are important in establishing one's reputation. Most speeches that are read tend to be dull and soporific. Obviously, for speeches before major audiences, a prepared text is useful. But take time to become so familiar with the text that it rolls off your tongue without hesitation. When speaking to faculty groups, speak off the cuff whenever possible; it builds their confidence in you as a leader. Ideally, you will be so familiar with the subject that extemporary speaking is not a problem. And have something of substance to say—particularly to the faculty.

- When talking with young students, don't be taken off guard by facial expressions or gestures that appear hostile or indifferent. When I've talked to these students later, it's been my experience that their intent was to be positive and friendly. Young people, particularly when encountering a president or chancellor, can be ill at ease; don't misinterpret their expressions or gestures.

As chancellor or president, you are viewed as someone with great knowledge and authority. On occasion, however, you will find yourself at a loss to understand the intricacies of some issue. I have in mind a technical presentation I once
received from a group of astronomers that was way over my head. On such occasions, you do the best you can. As chancellor and later as president, I’ve often been reminded of the character Chance, played by Peter Sellars in the movie “Being There” based on Jerry Kosinski’s novel. Chance finds himself in conversations he doesn’t understand and, being simpleminded, says things that other people misinterpret as profound because they believe he is someone with special knowledge.

Schools of Engineering

When I arrived at UCSD, the campus had no school of engineering, although there were several departments and research groups that at most universities would be included in a school of engineering. The explanation is straightforward. In the late 1960s a group led by Fred Terman of Stanford University was asked to assess engineering education in California and make recommendations for the future. At the time, California was in a recession and appeared to have an oversupply of engineers. Not surprisingly, Terman’s report recommended that no new schools of engineering be established in California, and consequently the San Diego, Santa Cruz, and Irvine campuses did not start engineering programs.

By 1980, however, the picture had changed. There were several reports by the National Research Council and the National Science Foundation pointing out the need for more engineers. One of my first initiatives as chancellor was to establish a school of engineering at UCSD. However, there was no reference to a new school of engineering in my publicly announced list of goals. The last thing the
faculty wants to hear is that the chancellor is pushing for a particular school or program and claiming credit for its creation. The faculty need to be at the forefront; a sure way to undermine any such effort is for the chancellor to claim credit for championing a new program while dragging the faculty along behind.

In establishing any new school, the faculty worry that resources will be diverted from other programs. Even though budgetary constraints were severe in the early 1980s, I was able to convince the faculty that new funds would be obtained. Another argument that helped gain faculty support was that the school would not be isolated from the rest of the campus--engineering students would meet the same liberal arts requirements as any other student. In addition, courses like calculus and physics would not be taught in the school of engineering but in already established departments.

After much maneuvering, the UCSD faculty senate voted to establish a program; however, they were not willing to call it a school of engineering. They insisted on naming it Division of Engineering, but they did approve the appointment of a dean of engineering. Over the course of the next several years, excellent faculty were recruited who in turn attracted significant federal funds. Student interest was high, and the programs received a great deal of local and national recognition. Given that kind of success, the faculty soon agreed to change the name to School of Engineering. In a recent *U.S. News and World Report* ranking, it was 15th among all U.S. schools of engineering—a remarkable ranking, given the school's brief history.
When I came to the University of California System as president, my intention was to establish schools of engineering at all of the UC campuses (except UC San Francisco, which is devoted exclusively to the health sciences) and to expand engineering across the system. I made no reference to the plan in my announced list of goals, for the same reason mentioned earlier. I was surprised at how quickly the statewide academic senate adopted recommendations to establish new schools of engineering, and to expand the number of students in engineering across the UC System by 50 percent (at both undergraduate and graduate levels). Governor Wilson and later Governor Davis were enthusiastic about the expansion and were generous in providing the necessary funds.

Some may believe that I have placed too much emphasis on engineering, but in our “new economy” the need for engineers--particularly with the type of education UC offers--is greater than ever. Further, an education in engineering is different today from what it was 30 or 40 years ago. It’s no longer a trade-school program but in every sense an academic discipline. Because of the Terman report, the percentage of engineering students across the UC System was woefully low by the 1990s; only UCLA and Berkeley had percentages that were comparable to institutions like Stanford and the University of Michigan. With the expansion of our programs, the overall percent of students studying engineering across the UC System will be similar to that at our comparison institutions.

I’m reminded of a story involving Hannah Gray, the former president of the University of Chicago. She is a good friend and someone for whom I have great
regard. Shortly after the engineering program was established at UCSD, she saw me at an AAU meeting and said in the presence of several university presidents, "Dick, there is something wrong with you. You're a product of the University of Chicago. You've always professed your belief in a liberal education and yet everywhere you go, you establish engineering programs. As director of NSF, you established the directorate of engineering, quite a departure from the original plan for NSF. Now you no sooner arrive at UCSD than you establish a school of engineering. What's wrong with you? Have you forgotten your roots at the University of Chicago?" Her comments were meant to be humorous but with a decided edge. I responded, "Hannah, engineering is not like it was when you and I were students. A degree in an area like electrical engineering or computer science or mechanical engineering is as much a liberal arts degree as a degree in physics, or history, or philosophy. Engineering students are engaged in real intellectual endeavors and no longer simply acquiring the tools of a trade." A modern research university without programs in engineering is at a serious disadvantage; the synergy between engineering and other disciplines is simply too important.

Appointment as President of the University of California

I will leave it to someone else to give a full account of the process that leads to the election of a UC president. In brief, a subcommittee of The Regents is established to evaluate and interview candidates; at the end of interview process, the chairperson of the subcommittee recommends one name to the full Board of
Regents for its concurrence. In addition to the Regents' subcommittee, there is a faculty committee appointed by the Academic Senate to sort through the list of candidates and provide advice to the Regental subcommittee.

In the presidential searches of 1983, 1992, and again in 1995, my candidacy was compromised by the fact that I'd been named in a lawsuit by a woman faculty member at Harvard University involving a personal matter. The lawsuit attracted national attention and was not settled until 1985. The settlement involved no admission of wrongdoing on my part, but after five years of legal hassles, my wife and I wanted to get the matter behind us.

Throughout my period as chancellor, I had strong support from the faculty and the lawsuit did not affect that support. Even though the lawsuit was settled in 1985, several Regents believed that the allegation alone was too big a drawback. In 1995, the chairman of The Regents’ subcommittee was determined to pick someone from outside the UC System, but the faculty advisory committee pressed hard for my appointment. The chairman of The Regents’ subcommittee offered the position to an individual from another university, but when the news of the offer leaked to the press, there were several embarrassing newspaper stories. The faculty committee announced that it had not been consulted and made its objections evident. The outside candidate withdrew. At that point the faculty committee was empowered and pressed vigorously for my appointment. Without determined faculty support, I doubt that I would have been selected as president. Fortunately, my record as chancellor was the principal news item when my appointment was announced, and only one or two newspapers had more than a few sentences about the lawsuit.
I dislike the phrase "capstone to a career," but in my case it fits. At the age of 66, this appointment would be my last. My academic career as a teacher and researcher at Stanford University, my early election to the National Academy of Sciences, my time in Washington, D.C., plus my 15 years at UCSD, all were excellent preparation. Age is a factor in jobs of this sort, but Rita and I were (and continue to be) in good health, and I still have the drive and vigor to be an effective president. Further, I had been well schooled in the problems of UC and the complexity of its relationships with the legislature and governor.

The governor and the lieutenant governor are ex-officio members of the Board of Regents. Pete Wilson was governor when I was elected president. We had known each other since 1980 and worked together well. While I was president, he made every effort to support the University and our budget. We had only two disagreements. One was over my decision to delay implementation of The Regents' resolution SP-1 (the elimination of affirmative action), and the other was about benefits for domestic partners. But even with these two complications, Pete was a good person to work with and someone I respect.

At the time of my appointment as president, Gray Davis was lieutenant governor. In that role he spent a good deal of time on University business and attended Regents' meetings regularly. We had come to know each other well while I was chancellor. He was interested in high tech and the role UCSD played in fostering high-tech companies in San Diego. While he was lieutenant governor, I introduced him to a number of business leaders in San Diego; he became familiar...
with the concept of “new growth theory” and has been a strong proponent of university research in shaping the California economy. When I was appointed president, Gray jokingly said to me that I should hope for his election as governor, for he would be one of my best supporters. Indeed that has been the case.

The NRC Report Rating Ph.D. Programs

The year I became president, the National Research Council (NRC) published Research Doctorate Programs in the United States: Continuity and Change, a massive report containing information on the quality of Ph.D. programs in American universities. The report covers 41 disciplines from the sciences to the humanities, and involves 274 universities. The reputational ratings were based on the judgments of approximately 8,000 faculty. I will not review the details of that report except to note that all UC campuses did remarkably well. The report rank-ordered universities in each of the 41 disciplines, but no overall ranking of universities was provided. However, David Webster and Tad Skinner, in an article that appeared in Change magazine in June 1996, took the next step of computing the “scholarly quality of program faculty” rankings averaged over individual disciplines for each university. These averages were then used to produce an overall ranking of universities. That ranking is presented on the next page for the top 50 universities.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution</th>
<th>Mean Score</th>
<th>Number of Programs Rated</th>
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In the article, the authors devoted the following section to the University of California:

The University of California (UC) system rated extraordinarily well in many areas, as did two of its campuses, UC-Berkeley and UC-San Diego.

UC-Berkeley rated exceptionally high any way you look at the Report’s figures. It achieved the second highest overall mean rating (4.49) of all 274 institutions rated, below only MIT. It had more programs rated in the top 10 in their disciplines (36) than did any other institution, ahead of Stanford (32), Harvard (26), Princeton (22), and MIT (20). It also had the highest proportion of its programs rated in the top 10 in their disciplines (36 of 37, or 97 percent), ahead of Harvard (26 of 30, 87 percent), MIT (20 of 23, 87 percent), Princeton (22 of 29, 76 percent), and Stanford (32 of 43, 74 percent)--the only other institutions that had more than 70 percent of their programs rated in the top 10. Of Berkeley’s 37 programs included in the Report, five were first, or tied for first, in their disciplines. Berkeley was rated first in chemistry and German and was tied for the rank of 1.5 in mathematics as well as in statistics (although it rated lower in biostatistics) and for the rank of 2.0 in English. Twenty of its programs were rated anywhere from second to fifth (including any ties) in their disciplines, and 11 more were rated from sixth to 10th. The only Berkeley program that rated lower than 10th was cell and developmental biology (13th).

UC-San Diego rated extraordinarily well, particularly for an institution that became a UC campus as recently as 1964. It was rated 10th in mean score (3.93) for faculty scholarly quality--higher than older and larger UCLA, higher than any public university campus in the United States except Berkeley, and higher than such highly regarded private universities as Columbia, the University of Pennsylvania, and Northwestern. Two of its programs--in neurosciences and oceanography--rated first in the United States. Three more programs at UC-San Diego rated from second to fifth, and nine more from sixth to 10th, for a total of 14 of its 29 doctoral programs (48 percent) that were rated in their discipline’s top 10.

Impressive as are the ratings of UC-Berkeley and UC-San Diego, the showing of the UC system as a whole is even more remarkable. Of its 229 programs included in the study, 119--or 52 percent--rank in the top 20 in their disciplines. The nine UC campuses represent only 3 percent of the 274 institutions included, and the eight UC campuses (all but UC-San Francisco) that have 15 or more programs rated represent only 8 percent of the 104 institutions in the category. Remarkably, however, these nine house 15 percent of the nation’s top 20 programs, 19 percent of its top 10 programs, and fully 20 percent of its top five
programs. Six of the nine UC campuses placed one or more programs in the top five in their disciplines, and eight of the nine—all but UC-Riverside—placed one or more programs in the top 10.

The eight UC campuses with 15 or more programs rated, taken as a group, achieve a higher mean score than do the 11 schools in the Big Ten. They score an average of 3.55 in faculty scholarly quality, compared to the Big Ten's 3.37, and 3.38 in program effectiveness, compared to the Big Ten's 3.32. This performance is astonishing, considering that the Big Ten universities, taken as a group, are much older than the UC campuses and have much larger faculties (reputational rankings of doctoral programs generally correlate quite highly with size of program faculty). It is all the more astonishing when one considers that at eight of the Big Ten universities—all except Indiana, Michigan State, and Northwestern—are, according to the Report, the highest-rated public research universities in their states.

In the past 40 years or so, many states that long had only one state university campus have established one or more other campuses, and some states are developing their new campus(es) to eventually achieve parity with the flagship campus. As of now, however, none of these non-flagship campuses has achieved anything approaching parity with any of the UC's five highest-rated non-flagship campuses.

Need I say more? This report was immensely helpful in making the case for the University of California with the governor, the legislature, and the general public. For a new president, the timing of the NRC report couldn't have been better.

The Knowledge-Based Economy and University Research

I've been a vigorous advocate for undergraduate education, but I've also paid special attention to graduate education and research. Not too many years ago, some legislators and commentators were fond of saying that the research universities should devote all of their resources to undergraduate education and "cease and desist" in their research efforts. That view is rarely expressed today, in large part because the case for university research and graduate education has been so well
documented. To give you a sense of my efforts in this regard, reproduced here is a section of a lecture I gave in October 1999 at the China-U.S. Joint Science Policy Seminar in Beijing.

The term "knowledge-based economy"--sometimes called the "new economy"--refers to a set of industries whose main products or services use information to decrease costs and create new opportunities for growth. Generally speaking, the industries of the new economy tend to produce jobs more rapidly and with higher salaries, increase productivity growth faster, and provide greater profits for employers than the "old" economy. These high-technology industries rely on a constant infusion of new knowledge to stay competitive, and the principal source of such knowledge is basic research. The California economy provides a striking example. Its recovery from the economic recession of the early 1990s depended on knowledge-driven businesses and jobs that didn't exist 15 or 20 years ago--biotechnology, telecommunications, and multimedia, for example.

The evidence regarding the relationship between research and development (R&D) and economic growth in the United States is overwhelming. As recently as the early 1970s, there was no substantial economic analysis of the relationship between investments in R&D and economic development. When I served as director of the National Science Foundation in the 1970s, we were well aware of the lack of such economic data in making the case to the Congress for federal support of research. And we realized that most of our arguments about how R&D affected economic growth were based on little more than anecdotal evidence. Accordingly, we initiated a special research program at NSF focused on just that issue--the relationship between investments in R&D and the growth of the American economy.

In the intervening 25 years, a substantial body of research has led to a development in economics called "new growth theory." This work was nicely summarized in a 1995 report of President Clinton's Council of Economic Advisors: 50 percent of the growth in the American economy in the last 40 years has been due to investments in research and development. Obviously, the private sector is a major driver of R&D, but federally funded research at universities also plays a key role. The report points out that when federal investments in university research increase, there is--with an appropriate time lag--a corresponding increase in private-sector investments. There is now a well-understood link between university-based research and industries' R&D efforts.
As I mentioned, the State of California provides one of the best examples of this linkage. In the early 1990s, the state endured one of the worst economic recessions in its history. California in prior periods had entered economic recessions later, and come out much earlier, than the rest of the United States. But in the 1990s this traditional pattern broke down. California suffered a brutal economic downturn fueled by tremendous cutbacks in defense and aerospace—a loss of jobs that resulted in a dramatic drop in the tax revenues of the state.

What has happened in the past few years? California has come storming back from the recession. Why? New jobs have been created at a fast rate. Where are those jobs coming from? From a particular type of activity: high technology. And these high-tech enterprises are not the vast IBM's and AT&T's of the world. The companies that pulled California out of recession are small, entrepreneurial, high-tech ventures. These companies (and their technologies) can be traced directly to the research universities of California, both public and private.

Biotechnology, for example, a booming industry in California, traces its success—in fact its very existence—to research programs that came out of the state's universities. Digital telecommunications is another case in point. It could not exist at its current scale and scope without the California universities that produce the research and educate the engineers and scientists essential to keeping this industry on the cutting edge.

California succeeded in its remarkable economic comeback because it possessed four advantages essential to the new economy: 1) world-class research universities that encourage faculty—and allow them to benefit financially—when they are involved in research that leads to the development of new technologies; 2) a supply of entrepreneurs experienced in launching and developing high-technology businesses; 3) venture capital and other sources of private investment in early stage business ventures; and 4) the accounting, legal, and other ancillary services needed by start-up companies.

I would like to mention a concrete example, one that I am familiar with because it began while I was chancellor of the San Diego campus of the University of California (UCSD). In the early 1980s, the San Diego region was in the midst of a painful economic transition created by the demise of many of its defense-related industries. It was clear that something needed to bridge the gap, but what? My colleagues and I decided that UCSD had to play a more aggressive role in regional economic growth, specifically in the high-technology and biotechnology areas. Our view was that small, high-technology corporations were the most likely candidates to fill the economic vacuum that followed reductions in defense
contracts to many San Diego corporations. UCSD had specific strengths it could contribute to the high-technology sector: the campus is one of the nation's top recipients of federal research funding; it was home to strong science departments and an excellent school of engineering.

We expanded the breadth of UCSD's basic research capacity, creating—in cooperation with industry—interdisciplinary research centers in such areas as magnetic recording, molecular genetics, wireless communications, and structural engineering. We reinvigorated our technology transfer programs in the science and engineering departments. And we created a program called UCSD CONNECT, which had as its goal not only technology transfer but also nurturing the business support infrastructure that has proven essential to small entrepreneurial firms. UCSD CONNECT draws on expertise across all campus departments and from all professional sectors. It has served to fill a critical gap in San Diego's business infrastructure, linking local high-tech entrepreneurs with financial, managerial, and technical resources.

What this means, for example, is that UCSD CONNECT will act as an agent on behalf of small companies to help them locate investors and find the research they need to develop new products. Working with start-up companies as early as the business plan stage, UCSD CONNECT will help an entrepreneur find contacts for raising capital, forming strategic alliances, gaining marketing and management expertise and technical advice. UCSD CONNECT is often referred to as an "incubator without walls" because it has nurtured so many successful businesses in San Diego.

UCSD CONNECT is just one example of the kind of help UC is committed to providing. There are similar efforts on every one of UC's nine campuses to bring venture capitalists and people from the industrial sector together with scientists and engineers on the campuses to move UC research ideas into application.

Two years ago, the University held a statewide conference on technology transfer, bringing people from UC together with colleagues in government and in industry to examine how we can do more to facilitate the transfer of technology. In response to the business community's concerns that California is not producing enough computer scientists and engineers, between now and 2005 we are committed to increasing enrollments in engineering and computer science (at both the undergraduate and graduate levels) by 50 percent across the UC system.

And we have established a program—the Industry-University Cooperative Research (IUCR) program, now in its fourth year—that seeks to identify the
most promising research areas for new products that, in turn, create new jobs. The IUCR program builds research partnerships involving industry and UC faculty. Let me explain briefly how it works.

A UC researcher joins with a scientist or engineer from a private company to formulate a research proposal. A panel of experts drawn from industry and academia selects the best proposals for funding. Industry investments are partially matched with University funds. In just three years, the investments by industry and UC have totaled more than $100 million for new research undertaken by University faculty and students. An important feature of the program is the opportunity for graduate students to participate in research. It would be difficult to overstate the crucial link between research and graduate education in American universities. Graduate students participate in all aspects of faculty research projects. This experience is an essential part of the educational process for graduate students that produces both excellent young faculty for universities and R&D leaders for industry. In the case of the IUCR program, graduate students learn firsthand about industry's needs and its opportunities. And industry gets the benefit of some of the world's brightest young minds.

Two-thirds of the 323 companies currently participating in the IUCR are small businesses. A particularly valuable benefit for them is the opportunity to work with UC faculty on multidisciplinary research that would be difficult or impossible to pursue in the private sector. Research supported by the IUCR program lays the foundation for next-generation technologies; it provides hundreds of UC students participating in the research a window on future career opportunities. The six industrial sectors that currently participate--biotechnology, communications, information technology, microelectronics, multimedia, and semiconductor manufacturing--are all critical to the California economy.

There is growing interest in programs like these not only in California but throughout the United States. The impetus to greater linkages between universities and industry grows out of a longstanding American belief that universities should not be divorced from society, but should be involved in helping solve society's problems.

The United States is unusual in the degree to which it relies on universities to perform basic research. The roots of this phenomenon date back over 50 to World War II. Near the end of the war, President Roosevelt turned to his science advisor, Vannevar Bush, for advice about the future of American science. Bush's report, which appeared shortly after President Roosevelt's death, was entitled "Science: The Endless Frontier." As the title suggests, Bush viewed science as a vast frontier of opportunities to serve virtually
every aspect of the national welfare. His report set the stage for the modern era of science and technology in the United States.

What were the arguments that Vannevar Bush put forward? First of all, he asked "Who should fund the research and development effort of the United States?" Let me make a few distinctions here.

For simplicity of expression, I will use the terms basic research, applied research, and development. Basic research is not focused on applications; the terms "curiosity research" and "discovery research" are sometimes used to describe it. It is driven by a sheer interest in the phenomena rather than potential applications. But basic research may reach a stage where there is potential for application and accordingly a need for applied research and, in turn, the development of new products and processes. Bush argued that applied research and development should be done by the private sector, by industry. But he also argued that the private sector would not provide adequate funding for basic research. In essence, he believed that private market mechanisms ensured that industry would invest in applied research and development, but that those same private market mechanisms would not generate adequate investment in basic research. Thus, he concluded that the funding of basic research was an obligation of the federal government.

The second question he asked was "Who should perform R&D activities?" Applied research and development, he said, is a private-sector responsibility; the private sector could be relied upon to perform that kind of activity. Who should perform basic research? The Bush concept, founded on the experiences of World War II, was that American universities should be the principal performers of basic research; and as noted above the federal government should provide the funds for that work.

Then there was a third part to Bush's analysis. He believed that basic research should be funded through a peer-review process. Individual scientists should make proposals for research projects and a group of peers--leading scientists from around the country--should evaluate these proposals and decide which to fund and which not to fund.

Federal science agencies in the United States do not provide unrestricted block-grant funding to universities. Rather, individual scientists submit proposals that request funding for specific research projects. A scientist's proposal is then sent to other scientists for their evaluation and judged competitively against other research efforts. This evaluation--the peer review process--is the critical factor in ensuring that the best science is funded.
Those were Bush's arguments: Applied research and development should be funded and conducted by the private sector; basic research should be performed in universities and be funded by the federal government via a peer-review process. The Bush model created a sea-change for American universities. Before World War II, universities were peripheral to the R&D enterprise. Today they are at the center of American research activities, thanks in large measure to an extraordinarily successful partnership with the federal government. As a result, both the research enterprise itself and the U.S. economy have prospered. I do not believe it is an overstatement to say that when the history of the last half of the twentieth century is written, the role research universities have played in the American economy will be regarded as one of our greatest accomplishments.

In recent years, there has been much discussion in the United States about the need for a new national science policy, on the premise that Bush's 50-year-old vision cannot provide a blueprint for the twenty-first century. It is true that some of the arguments in Bush's report are now questionable, some of the issues he considered important are of interest only to students of the period. What remains pertinent is his vision of the role of government in research, including his assertion that the federal government has both the authority and the obligation to support basic research. More boldly, by arguing for the primacy of basic research supported according to norms set by scientists themselves, Bush implicitly asserted that universities defined the U.S. research enterprise. Bush gave them pride of place at the center because, as he argued, they had the potential to energize the entire system.

In spite of these remarkable successes, there is a concern in the United States today that federal funding for basic research will decline as the government struggles to balance its budget. The President of the United States and the Congress have reaffirmed their commitment to keep the federal budget balanced and to use a part of the surplus to reduce the national debt. Although some of the predictions about draconian cuts in federal funding for research have not so far materialized, this remains a matter of concern to universities throughout the nation.

The potential erosion of federal support for academic research is worrisome precisely because of the central role universities play in the overall R&D effort. Could industry take their place as the vital center of the American research enterprise? The evidence suggests not. As recently as a decade ago, several large U.S. firms performed significant basic research in their corporate laboratories. Today, virtually all industrial research focuses on the solution of specific problems, often by building on the results of univer-
sity research. AT&T and IBM have essentially pulled out of basic research; both companies have come to the view that they are not wealthy enough to support basic research—at least not at the level they once did. In the United States we are relying more than ever on universities for the basic research that will ultimately fuel our economy. A recent statistic sums it up: Seventy-three percent of the papers cited by U.S. industry patents are based on publicly supported science, authored principally by university scientists; only 27 percent are authored by industrial scientists.

I am more optimistic than many of my colleagues that the federal government will find a way to continue funding university research at a reasonable level. Most political leaders in the United States who have thought about these issues—Democrats and Republicans alike—have concluded that support of our research enterprise is critical to the national interest, and therefore sound federal policy.

In its simplicity and flexibility, Bush’s report remains a model for science policy in the United States.

Appointment of Chancellors

Every UC president has organized the search for chancellors somewhat differently. The procedure I adopted has several unique features that have proved valuable. By way of background, I should note that I have never employed a search firm in recruiting chancellors. I have nothing against search firms and have enlisted their aid for other senior-level positions. However, when searching for chancellors or presidents, even the best firms provide no added value in identifying a pool of candidates; further, by and large, they do not understand the subtleties of a research university well enough to make the right inquiries on background checks. Too often these firms have established cozy relationships with individuals who are perpetually on the prowl for chancellorships or presidencies; these individuals may interview well with a search committee, but usually lack the ability to lead a major research university.
Cited below is the “University of California Procedure for Appointment of Chancellors” which was revised in November of 1995.

The President of the University of California will conduct a continuous search for promising candidates for Chancellorships. This process is included as an important complement to the systematic, nationwide search which will be undertaken each time a vacancy occurs.

When a vacancy occurs or is imminent, a Committee will be appointed to advise the President. The Committee will consist of (a) five Regents appointed by the Chairman of the Board, (b) five faculty members appointed by the President from a panel submitted by the campus Academic Senate Committee on Committees, (c) a graduate student and an undergraduate student appointed by the respective graduate and undergraduate student associations of the campus, (d) an alumni representative appointed by the alumni association of the campus, (e) a representative appointed by the foundation affiliated with the campus, and (f) a staff employee of the campus selected in accordance with procedures established by the President. In addition, the Chairman of the Board and the President will serve on the committee and the President will serve as chair.

The President of the University will submit to the Committee for evaluation not less than five nor more than fifteen names of candidates whom the President considers promising. The Committee will evaluate these nominations of the President and may consider or suggest other names. It may interview candidates. It will solicit the opinions of interested groups in whatever manner it considers appropriate.

Both the Committee and the President shall be mindful of the University's firm commitment to equal employment opportunity and affirmative action in seeking the most qualified candidates.

After the President has been advised by the Committee of its evaluation of the candidates, the President will make a recommendation to The Regents for appointment.

Once a search committee has been established, a series of four all-day meetings typically takes place over a period of eight to ten weeks. The purpose of
these meetings is to trim the initial pool of individuals to a short list of six or seven candidates. At the last meeting, it is the president's task--at his own discretion and without explanation--to select four individuals from the group of six or seven to be interviewed by the search committee.

All four interviews take place on the same day, usually in a hotel near the Office of the President. No one on the search committee knows the names of the four individuals until the day of the interview. Unlike some universities, the four finalists are not required to pledge that they will accept the position if they agree to be interviewed. Every effort is made to maintain secrecy in order to protect the reputation of the candidates and ensure the integrity of the process.

After each interview, the committee discusses the pros and cons of that candidate; then, after all four interviews, there is a general discussion. However, at no point does the search committee, as a group, take a vote or rank the candidates. Rather, at the end of the day, each member fills out a form in private ranking the candidates, and provides an explanation for his or her ranking. As president, I am the only person who sees these rankings, and once I have reviewed them, they go directly to the paper shredder. Consequently, no one on the search committee knows who is first, second, or third choice. This process may seem excessively secretive, but even the best committees--particularly ones as large as our search committees--have at least one member who will leak information to the press.

The most significant change from earlier UC search procedures was not taking a vote in the presence of the search committee. To not vote as a group may seem undemocratic, but it does ensure confidentiality. Moreover, each member of
the search committee comes to the task with a somewhat different set of interests and that needs to be considered in weighing his or her advice.

It is my task to analyze the committee members' individual rankings and, using my best judgment, establish a preference order among the four interviewees. When it comes time to make an offer, the exchange with the candidate has all the features of a Kabuki dance. No offer is made until the candidate has accepted the offer. The point here is that if a candidate should turn us down, then he or she was never given an offer. By design, we always end up with our first choice. The aim is to protect both the reputation of the individuals involved and the reputation of the institution. If all goes well, no one will be able to state with assurance that a particular person was rejected by the University, nor will anyone be able to say that they rejected the University's offer. Good candidates who already have excellent jobs are usually not willing to expose themselves to the type of public scrutiny that goes on at so many universities; if they are not selected for the position, then to some extent they become damaged goods.

If a UC president were to be judged on only one dimension, then I would propose that the most important dimension is the quality of chancellorial appointments. A good deal of my time as president has been involved in chancellor searches. Among the current group of ten chancellors, only Ray Orbach, Larry Vanderhoef, and Henry Yang were appointed prior to my being named president. Henry Yang started as chancellor at the same time I started as president; I wish I could claim him as one of my appointees because he has done a magnificent job at Santa Barbara.
During my first year, M.R.C. Greenwood was appointed as chancellor of the Santa Cruz campus and Bob Dynes as chancellor of the San Diego campus. During my second year, Bob Berdahl was appointed as chancellor of Berkeley and Al Carnesale as chancellor UCLA. Haile Debas was appointed as chancellor of the San Francisco campus that same year without a search. Haile was adamant that he was willing to serve only one year. I could have appointed him as an acting chancellor, but given his major contributions to the campus, he deserved recognition as chancellor without qualification. The third year, I appointed Ralph Cicerone as the chancellor of Irvine, Michael Bishop at San Francisco, and Carol Tomlinson-Keasey as the first chancellor of the Merced campus.

Eight chancellors were appointed in my first three years as president. Each of these individuals had a distinguished academic career, and all have proved to be capable and innovative administrators.

After appointing a chancellor, the president has the responsibility to create an environment on the campus that helps ensure the chancellor's success. The first few weeks and months are critical. The president must accompany the chancellor at campus and community meetings, and take every opportunity to express The Regents' and president's unstinting support. Strong public support needs to be accompanied by private advice about the strengths and weaknesses of key people on the campus. The chancellor should be assured he or she has the flexibility to make whatever personnel changes are necessary--with the full support of the president. For the president to walk away and leave the chancellor to sink or swim is repre-
hensible. If a chancellor fails, the president either has selected the wrong person or has not provided the necessary support.

A reserve fund should be established at the campus, so that the new chancellor will have some flexibility in budget matters. In this regard, I blundered early in my presidency. On one of my early appointments, I had worked with the campus budget officer and the outgoing chancellor to determine the size of their reserve and indicated that the reserve should remain intact until the new chancellor was in place. To my shock, the retiring chancellor dispersed virtually all of the funds in the reserve in his last week in office. There is no longer ambiguity in this matter. I now require that an appropriate reserve be sequestered before the search process begins.

One precaution, often overlooked until too late, involves the expenditure of funds to renovate or redecorate the chancellor's residence (University house). Too often, the press and students have had a field day criticizing a new chancellor for any expenditures on the house, no matter how small. When Karl Pister became chancellor of the Santa Cruz campus in the 1980s, he purchased a much-needed washer and dryer; that purchase unleashed a barrage of criticism from students and others that lasted for weeks. When I became president, I chose to take full responsibility for all funds expended on the maintenance and renovation of University houses. Several of our houses were in a bad state of repair and needed to be seismically retrofitted. I wanted to protect the chancellor by making it clear that house expenditures were strictly the responsibility of the president. As it turned
out, we incurred some staggering bills in bringing houses up to a safe and livable standard. There were a few newspaper stories giving a detailed account of the expenditures; but, without the chancellor to blame, no one seemed particularly interested.

The Respective Duties of the President and the Chancellors

The University of California has evolved from "one campus with one president" to "a system with one president and multiple campuses, each with a chancellor." The history of that transformation is thoughtfully described in Gene Lee's book, *The Origins of the Chancellorship: The Buried Report of 1948*. The history helps explain the uniqueness and indeed the greatness of UC. We are not a system with one flagship institution and an array of satellite campuses, but rather a system of nine institutions (soon to be ten) each of which, as I have explained earlier, has earned the distinction of being designated a research university.

My goal here is not to review that history but rather to make some remarks about the respective roles of the president and the chancellors. On the next eight pages I've reproduced two of The Regents' standing orders. Standing Order 100.4 describes the duties of the president and Standing Order 100.6 the duties of the chancellors.

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STANDING ORDER 100.4 Duties of the President of the University

(a) The President shall be the executive head of the University and shall have full authority and responsibility over the administration of all affairs and operations of the University, excluding only those activities which are the responsibility of the Secretary, Treasurer, and General Counsel of The Regents. The President may delegate any of the duties of the office except service as an ex officio Regent.

(b) The President is authorized in the name of The Regents to award degrees to candidates recommended by the Academic Senate for degrees in course and certified by the respective registrars, and to confer honorary degrees, the award of which has been approved by the Board. In the absence of the President, or when specifically delegated by the President, the Chancellors on the respective campuses of the University shall confer the honorary degrees so awarded by The Regents. Degrees in course, awarded by the President as prescribed above, may be conferred by any Officer of the University, including Officers of the respective campuses, on delegation by the President. The President shall seek the advice of the Academic Senate, through committees appointed in a manner which the President shall determine, in connection with the award of all honorary degrees.

(c) The President of the University, in accordance with such regulations as the President may establish, is authorized to appoint, determine compensation, promote, demote, and dismiss University employees, except as otherwise provided in the Bylaws and Standing Orders and except those employees under the jurisdiction of the Secretary, Treasurer, and General Counsel of The Regents. Before recommending or taking action that would affect personnel under the administrative jurisdiction of Chancellors, Senior Vice Presidents, Vice Presidents, or Directors of the Ernest Orlando Lawrence Berkeley National Laboratory, the Ernest Orlando Lawrence Livermore National Laboratory, and the Los Alamos National Laboratory, the President shall consult with or consider recommendations of the appropriate Officer. When such action relates to a Professor, Associate Professor, or an equivalent position; Assistant Professor; a Professor in Residence, an Associate Professor in Residence; or an Assistant Professor in Residence; a Professor of Clinical (e.g., Medicine), an Associate Professor of Clinical (e.g., Medicine) or an Assistant Professor of clinical (e.g., Medicine); a Senior Lecturer with Security of Employment, or a Lecturer with Security of Employment, the Chancellor shall consult with a properly constituted advisory committee of the Academic Senate.

(d) The President and those of his staff to whom he may delegate such authority are authorized to act as agents of The Regents to carry out the collective bargaining responsibilities of the University under the Higher Education Employer-Employee Relations Act (HEERA sections are 3560-3599). Whenever the President, under either general or specific authority delegated to
him, takes action affecting the terms and conditions of employment of University employees, it shall be understood that for employees represented by an exclusive representative, such action may be taken only after satisfaction of any obligation the University may have to meet and confer with respect to such action, and then only to the extent approved by the President.

(e) The President is authorized to grant leaves of absence with or without pay, in accordance with such regulations as the President may establish, except that paid leaves of absence that exceed ninety days for Chancellors, Laboratory Directors, Senior Vice Presidents, and Vice Presidents shall be subject to approval by the Board upon recommendation of the President of the University.

(f) The President annually, through the appropriate Standing Committee, shall present to the Board recommendations as to the budget of the University, recommendations as to the Capital Improvement Program of the University, and recommendations as to requests for appropriations of funds for the University.

(g) The President shall fix and determine the amount, conditions, and time of payment of all fees, fines, and deposits to be assessed against students of the University, except that the President shall secure the Board's approval prior to the assessment of the University Registration Fee, Educational Fee, tuition fees, compulsory student government fees, and fees and charges required in connection with the funding of loan financed projects, except parking facilities and housing projects.

(h) The President shall fix the calendar of the University, provided that no session of instruction shall be established or abolished except with the advice of the Academic Senate and the approval of the Board.

(i) The President is authorized to make awards of fellowships, scholarships, and prizes with the advice of the Chancellors and the Academic Senate, and to approve expenditures from appropriations, gifts, and endowments for these purposes.

(j) The President shall consult with the Chancellors and the Academic Senate regarding the educational and research policies of the University, and shall keep the Chancellors and the Academic Senate informed about significant developments within the University and within the State and Federal governments which may have serious consequences for the conduct of education and research within the University. The President shall present recommendations to the Board concerning the academic plans of the University and of the several campuses. The President shall transmit to the Board any memorial which the Academic Senate may address to The Regents.

(k) The President shall develop, initiate, implement, and approve fundraising campaigns for the benefit of the University in accordance with the policies of the Board.

(l) The President shall represent the Corporation and the University in all matters requiring action by the Congress or officers of the United States or by the Legislature or officers of the State of California.
The President is authorized to negotiate and approve indirect cost rates to be applied to contracts and grants under which the University conducts programs supported by extramural funds, provided that such negotiations shall be directed toward full recovery of indirect costs, except that the fixed payment in lieu of indirect costs under the major United States Department of Energy contracts shall be approved by the Committee on Finance. Newly approved indirect cost rates determined under the provisions of Office of Management and Budget Circular A21, and any successor publication thereto, shall be reported to the Committee on Finance annually.

The President is authorized to permit expenditures against contracts, grants, and gifts, or against firm commitments thereon, provided that the contracts, grants, and gifts have been solicited or negotiated in accordance with established Regental policy.

The President is authorized to approve transfers or allocations of University operating funds and transfers of funds designated for Capital Improvement purposes, subject to any limitations which might be imposed by the terms of said funds, provided:

1. That no such transfer or allocation shall result in the establishment of a new policy, program, or project involving a continuing commitment;
2. That no transfer shall be made from a reserve fund for a purpose other than that for which the reserve fund was established.

The President is authorized to approve the incurring of commitments and expenditures against the following year's budget in advance of the effective date thereof. Advance commitments for expenditure for materials, services, and equipment shall not exceed fifty percent of the Governor's budget proposal to the Legislature for such purposes for the ensuing fiscal year. Advance commitments for appointments shall not exceed the number of positions and the funds provided in the Governor's budget proposal to the Legislature for the ensuing fiscal year. The number of such advance commitments authorized shall be determined annually by the President.

The President is authorized to approve amendments to the Capital Improvement Program for projects not to exceed $10 million. The President is also authorized to approve amendments to the Capital Improvement Program for projects exceeding $10 million up to and including $20 million, provided that concurrence is obtained from the Chairman of the Board, the Chairman of the Committee on Grounds and Buildings, and the Chairman of the Committee on Finance, and also provided that all actions taken in excess of $10 million up to and including $20 million under this authority be reported at the next following meeting of the Board. However, the following shall be approved by the Board: (1) projects with a total cost in excess of $20 million, (2) for projects in excess of $20 million, any modification in project cost over standard cost-rise augmentation in excess of 25%, or (3) capital improvement projects of any construction cost when, in the judgment of the President, a project merits review and approval by The Regents because of special circumstances related to budget matters, external financing, fundraising activities,
project design, environmental impacts, community concerns, or substantial program modifications.

(r) The President is authorized to modify budget estimates of income of wholly or partially self-supporting activities, and in connection therewith to increase or decrease appropriations accordingly. Such authorization is subject to the availability of funds.

(s) The President is authorized, in accordance with the terms specified by the donor, to designate the purpose for which, and the campus or other location at which, the income and/or principal of a gift shall be used and to make allocations in accordance therewith.

(t) The President is authorized to determine, consistent with any expressed intent of the donor, the purpose for which and the campus or other location at which a gift shall be used, to determine whether income and/or principal shall be used, and to make allocations and reallocations in accordance therewith, to the extent not specified by the donor of a gift.

(u) Any action taken pursuant to sections (s) and (t) above shall conform to established University programs and policies and shall not constitute a commitment requiring expenditures in excess of budgeted items.

(v) The President is authorized, after consultation with the General Counsel, to return to the donor all or any unused portion of a gift of personal property, when the purposes of the gift have been fulfilled or fulfillment has become impossible or impracticable and when alternative uses are precluded.

(w) The President is authorized to write off bad debts, provided reserves for that purpose are adequate or that specific income or an appropriation is available for that purpose. A report on bad debt write-offs shall be submitted annually to the Committee on Finance.

(x) The President is authorized to write off against funds received from the Federal Government in reimbursement of indirect costs, routine disallowed claims under grants and contracts.

(y) The President is authorized to appoint and to execute necessary agreements with executive architects, executive landscape architects, and executive and consulting engineers for approved projects.

(z) The President is authorized to approve building plans and to solicit bids in connection with approved projects, except that the President shall not approve the design of such projects as the Board has specifically designated as requiring design approval by the Committee on Grounds and Buildings.

(aa) The President is authorized to approve the siting of individual buildings or projects, provided that their locations are generally in accordance with a long-range development plan previously approved in principle by the Board, and to approve the siting of individual buildings or projects on University properties, such as field stations and research stations, which may not be covered by approved long-range development plans.

(bb) The President is authorized to execute on behalf of the Corporation claims against debtors in bankruptcy, in receivership or in liquidation, and against estates of deceased persons.
(cc) The President is authorized to approve and execute on behalf of the Corporation contracts, real property rental agreements, and other documents pertaining to the use of facilities for academic, research, or public service programs of the University, or for related administrative support activities with a term of no more than ten years, including option periods provided that base annual rent (exclusive of operating expenses and all concessions to the University) shall not exceed $500,000 for the initial year, and annual rent increases for subsequent years shall be limited to either (i) the actual annual percentage increases in the Consumer Price Index for all Urban Consumers (CPI-U all items), or (ii) such amounts that, when the rent is aggregated over the lease term, the total base rent does not exceed $10 million. Provided that concurrence is obtained from the Chairman of the Board and the Chairman of the Committee on Finance, the President is also authorized to approve and execute contracts, real property rental agreements, and other documents, as described above, provided that base annual rent shall not exceed $1 million for the initial year, and that, when the rent is aggregated over the lease term, the total base rent does not exceed $20 million, and also provided that all actions taken for these amounts under this authority be reported at the next following meeting of the Board. Amounts in excess of the $1 million and $20 million described above require Board approval. The maximum initial year base rent and the maximum aggregate rent specified above shall each be increased annually by a percentage equal to the percentage increase in the National Consumer Price Index for all Urban Consumers (CPI-U all items) for the preceding year, said increase to be reported annually to the Committee on Finance.

(dd) Except as otherwise specifically provided in the Bylaws and Standing Orders, the President is authorized to execute on behalf of the Corporation all contracts and other documents necessary in the exercise of the President's duties, including documents to solicit and accept pledges, gifts, and grants, except that specific authorization by resolution of the Board shall be required for documents which involve or which are:

1. Exceptions to approved University programs and policies or obligations on the part of the University to expenditures or costs for which there is no established fund source or which require the construction of facilities not previously approved.
2. Renewal or modification of prime contracts with the Department of Energy for the operation of the Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and the Los Alamos National Laboratory.
3. Loans of funds of the Corporation, other than loans from established student, faculty, and staff loan funds.
4. Agreements for the provision of employee group insurance benefits, with the understanding that Board authorization shall not be required for periodic revisions to existing agreements when the revisions do not substantially change the authorized scope of the benefit plans.
5. Affiliation agreements with other institutions or hospitals involving direct financial obligations or commitments to programs not previously approved.

6. Agreements with associations composed of medical staff for collection of professional fees for services rendered to patients at University or affiliated teaching hospitals.

7. Applications for new licenses to the Federal Communications Commission for authority to operate radio or television broadcast equipment.

8. Construction contracts in excess of appropriated funds.

9. Agreements by which the University assumes liability for conduct of persons other than University officers, agents, employees, students, invitees, and guests. This restriction does not apply to agreements under which the University assumes responsibility for the condition of property in its custody.

(ee) Anything contained in subsection (dd) above to the contrary notwithstanding, the President is authorized to take all actions and to execute all documents necessary in the exercise of the President's duties when an emergency precludes prior submission to the Board, provided that in all such cases the President shall report such actions to the Board, through an appropriate Standing Committee, at its next regular meeting.

(ff) The President is authorized to negotiate the sale, purchase, receipt by gift, or lease of real properties which are used, held, or to be acquired for campus-related purposes, and to administer all such properties, which are defined as properties within the boundaries of a campus of the University and other properties used, held, or to be acquired for student and employee housing, parking, athletic programs, research, public service, educational programs, or administrative staff purposes of the University.

(gg) The President is authorized to approve the sale, purchase, receipt by gift, or other acquisition of real property when such real property (1) is used, held, or to be acquired for campus-related purposes as defined in (ff) above, and the consideration does not exceed $10 million, (2) consists of for-sale housing units within an approved University for-sale housing program, (3) is acquired through foreclosure, deed-in-lieu of foreclosure, or otherwise in realization of a security interest under an approved University home loan program, or (4) is the former residence of a recently recruited employee acquired pursuant to an established personnel policy for covered moving expenses. The President is also authorized to approve the sale, purchase, receipt by gift, or other acquisition of real property, as described above, when the consideration is in excess of $10 million up to and including $20 million, provided that concurrence is obtained from the Chairman of the Board and the Chairman of the Committee on Finance, and also provided that all actions taken for these amounts under this authority be reported at the next following meeting of the Board. Amounts in excess of $20 million require Board approval.

(hh) In furtherance of the authority set forth in (ff) and (gg) above, the President is authorized to execute documents, except those conveying title; provided,
however, that any such documents executed prior to approval by the Board or by a Committee thereof empowered to act, or by the President in accordance with (gg) above, shall be conditioned upon such approval.

(ii) The President shall be the custodian of all contracts of sale, mortgages, and deeds of trust for all real property held or acquired for campus-related purposes and of all insurance policies and other documents relating to such instruments.

(jj) The President is authorized to approve and execute licenses, easements, and rights-of-way with respect to real property held or acquired for campus-related purposes when (1) the consideration does not exceed $10 million or (2) such instruments are revocable with 120 days' notice.

(kk) The President is authorized to approve leases, assignment of leases or subleases, and related amendments of such documents for mineral rights, including gas, oil, and other hydrocarbons, or geothermal resources as to real property held or acquired for campus-related purposes if the land rent does not exceed $500,000 per year during the primary lease term.

(ll) The President is authorized to take all appropriate action incident to the administration of University home loan programs as approved by The Regents, including (1) receiving and administering promissory notes, mortgages, deeds of trust, grant deeds, and deeds-in-lieu of foreclosure, (2) executing releases and satisfactions of mortgages and requests for reconveyances of deeds of trust when the University home loan program notes secured by such mortgages and deeds of trust have been paid in full or otherwise satisfied, and (3) accepting title to real property through foreclosure, deed-in-lieu of foreclosure, or other similar actions.

(mm) The President is authorized to develop and implement policies and procedures on matters pertaining to intellectual property, including patents, copyrights, trademarks, and tangible research products, and to execute documents necessary for the administration of intellectual property, including those which may contain commitments existing longer than seven years. The President annually shall report to the Board on matters pertaining to intellectual property.

(nn) The President is authorized to approve external financing for amounts up to and including $10 million for the construction, acquisition, equipping, and improvement of projects in the President's areas of responsibility. The President is also authorized to approve external financing for amounts in excess of $10 million up to and including $20 million, provided that concurrence is obtained from the Chairman of the Board and the Chairman of the Committee on Finance, and also provided that all actions taken in excess of $10 million up to and including $20 million under this authority be reported at the next following meeting of the Board. External financing in excess of $20 million requires Board approval.

Includes amendments through October 14, 1999
STANDING ORDER 100.6 Duties of the Chancellors

(a) The Chancellor of each campus shall be the chief campus officer thereof and shall be the executive head of all activities on that campus, except as herein otherwise provided and excepting such activities as may be designated by the Board as University-wide activities; and with reference to these on a particular campus the Chancellor shall be consulted. In all matters within the Chancellor's jurisdiction, the Chancellor shall have administrative authority within the budgeted items for the campus and in accordance with policies for the University as determined by the President of the University. The Chancellor shall be responsible for the organization and operation of the campus, its internal administration, and its discipline; and decisions made by the Chancellor in accordance with the provisions of the budget and with policies established by the Board or the President of the University shall be final. The Chancellor of each campus shall nominate Officers, faculty members, and other employees on that campus in accordance with the provisions of these Standing Orders.

(b) The Chancellor on each campus shall appoint all the members of the instructional staff deemed necessary for the conduct of instruction in any summer session on that campus, and may fix their remuneration in accordance with the provisions of the budget established by the Board and of the salary scales of the University.

(c) The Chancellor of each campus shall preside at all formal functions on that campus. At formal exercises and ceremonies attended by the President, the Chancellor shall present the President, who, as the University's chief executive, shall function in accordance with the University's rules for protocol and procedure. The Chancellor, with the approval of the President, may replace or supplement formal exercises on the campus, including Commencement exercises, with informal functions at which Vice Chancellors, Provosts, or Deans may preside.

Includes amendments through February 19, 1971
The president’s document runs on for many pages of closely spaced text, whereas the chancellor’s document requires less than one page. The standing order for the president was drafted in the early days of the University—in the 19th century—and over the years has been revised, maintaining the style of the original document. In contrast, the standing order for chancellors was drafted in the 1950s. It is a brief and concise document and does not spell out every possible detail of the chancellor’s duties.

The difference between the two documents in part reflects the change in literary style from one century to the next. However, the nature of the standing order for the president has an historical antecedent. In the early days of the University, The Regents conducted most of the day-to-day business of the institution and the latitude of the president was narrowly prescribed. Indeed, the vice president for business affairs reported directly to The Regents until 1959. The last such direct reporting relationship changed only this summer; at its July 2000 meeting, The Regents resolved that the treasurer should henceforth report to the president.

In the UC System, the chancellor’s responsibilities and day-to-day activities are very much like that of a president of a private research university. The chancellor’s constituents are the students, the faculty and staff, alumni, friends of the campus, and the greater campus community. In recent years, private philanthropy has been critical, and no chancellor can be successful without being an effective fundraiser.
I have written about the role of the president elsewhere and refer the reader to those documents (www.ucop.edu). My intent here is to emphasize that the president of the University of California is not a president in the traditional sense of that term. The president, of course, deals with all constituents of the University, but his principal responsibilities lie with The Regents, the governor, the State legislature, the universitywide academic senate, and the federal government. The president has a limited role in the life of students or the day-to-day events on the campuses. In order to fulfill his responsibility, the president must spend more time in Sacramento and Washington, D.C. than on visits to the campuses.

It's important that the president understands his role vis à vis the chancellors, and does not inject himself into the politics of a campus. Constituents of a campus--students, faculty, staff, alumni--must not be encouraged to bypass the chancellor and go directly to the president to air problems or to make special requests for funds or new programs. To understand the types of problems that arise, read some of the oral histories of previous chancellors.

I hope that the chancellors I have worked with will attest to the fact that I was careful not to be drawn into the affairs of the campus. I sought to give the chancellors as much independence and freedom as possible. When I first became president, I regularly asked the chancellors to identify issues where they thought the president's office was intrusive in their affairs or burdened the campus by requiring unnecessary approvals.

Many changes were made, some as trivial as letterheads. In an earlier period, there was a presidential order that the chancellor's letterhead should have
the president listed by name and title at the top lefthand corner with the chancellor's name and title immediately below. From a systemwide perspective, this may appear reasonable, but it led to confusion at the campus level. On one occasion while I was chancellor, an individual came to my office. He handed me a letter that I had written to him and explained that he did not wish to deal with me but rather with the president of UC San Diego. That type of confusion undermines the authority and effectiveness of the chancellor.

The move of the Office of the President from its location adjacent to the Berkeley campus to its current site in Oakland was helpful in this regard. Prior to the move, there were many occasions when confusion and rivalry existed on the Berkeley campus as to who was indeed the chief campus officer--the chancellor or the president.

When the next search for a president takes place, it will be important for all concerned to clearly understand the unique role of the president of the University of California. The job is not like that of other university presidents. The search committee, The Regents, and candidates need to appreciate the differences. If an incoming president expects to be greeted by a marching band and the adulation of an assembly of students and parents, he or she will be surely disappointed.
The Future of the University of California

What follows in this section is an unpublished paper prepared in September 1998, giving my views on issues confronting UC and how they will shape the University in the 21st century.

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The role of knowledge in transforming virtually every aspect of our world has moved research universities like the University of California to center stage of American life. More than any other institution in our society, research universities are on the cutting edge in producing the well-educated people who drive our economy and the new research ideas that keep it growing.

The tradition of research universities has been to value knowledge for its own sake. However, society's increasing need for applications of knowledge has placed new demands on these institutions, including the University of California, as we move into the twenty-first century. I want to discuss the organizational changes, goals, and initiatives UC needs to pursue to meet these demands and to sustain itself as a great university. These reflections do not cover all the issues of importance to the University. Instead I am concentrating on a few of the trends that, in my judgment, will shape our future as a particular kind of university during a particular period in its history. I should emphasize that these are personal views. They have not been fully discussed with Regents, Chancellors, faculty, or other members of the University community.

Assumptions

I begin with some assumptions. The first assumption is that California will continue its 38-year commitment to the Master Plan for Higher Education. The combination of record numbers of students and constrained funding for higher education over the next two decades will test California's will to keep the Master Plan's promise of access, quality, and affordability. But although some details of the Master Plan may need to be altered to address new circumstances, its central idea--the concept of three public segments (the University of California, the California State University, and the Community Colleges) with different missions, admission standards, and responsibilities--should endure because it serves this state so well.

My second assumption is that the University of California's future is committed to the notion that we will remain a research university. And by the term "research university" I mean an institution in which the search for knowledge is at the center of everything we do. This does not mean a university in which research is carried out at the expense of undergraduate education. Rather, a university in which, in the words of a 1974 University of California mission statement, every responsibility is "shaped and bounded by the central and pervasive mission of discovering and advancing knowledge.”
Research universities in a knowledge-based society

For 50 years we have had a good understanding of the role of education as a driver of the economy, but it is only in the past 10 to 15 years that we have begun to fully understand the impact of research and development (R&D) on economic growth. A substantial literature on this subject has evolved, which has led to a development in economics called "new growth theory." This work is nicely summarized in a report by the Council of Economic Advisers: 50 percent of American economic growth since World War II has been the result of investments in research and development. Obviously, the private sector is a major driver of R&D, but federally funded research in universities like UC also plays a key role. The literature also supports the conclusion that when investments in university research increase, there is (with an appropriate lag) a corresponding increase in private-sector investments.

No state in the country illustrates the connection between knowledge and wealth more vividly than California. Almost all of the industries in which California leads the world--biotechnology, software and computers, telecommunications, multimedia, semiconductors, environmental technologies--were born of university-based research. Hewlett-Packard, one of the top ten exporter companies in the United States, estimates that over half of its revenue comes from products that were developed within the past two years. More and more of these products are emerging from work done at universities.

Ensuring strong economic growth has implications beyond simple dollars and cents. The state and the nation face tremendous problems--deteriorating inner cities, homelessness, degradation of the environment, the prospect of a huge number of baby-boomers retiring with a far smaller workforce to support them in their retirement. How are we going to deal with these problems? There is only one way--we must have substantial economic growth. This requires investments in university-based research and a highly educated workforce. The link between California's success and the success of its universities is clear and direct.

Even as research universities are being called on to contribute more to economic vitality, they are being transformed by a revolution they themselves helped create. The way learning takes place--the interaction between teacher and student--has not varied much since the time of Plato's Academy over 2,000 years ago. But today, computer and communication technologies are creating a dramatically different environment.

Videoconferencing, interactive instruction via the Internet, and various forms of computer-assisted learning are transforming the educational process throughout the University of California. There are many examples, but one of the most exciting is the recently established California Digital Library (CDL). This is a virtual library that will make UC's digital collections--not just books but works of art as well--available via computer to UC faculty and students. Ultimately, the CDL is intended to be California's library, open to all the citizens of this state. We will accomplish this goal through a partnership with the California State Library and California library leaders to employ the CDL as the primary means of making digital library services available throughout California.
The California Digital Library illustrates how learning is beginning to transcend the conventional limits of time and space that have bound universities to a particular place and a particular schedule. The term “lifelong learning” takes on new meaning in light of the capacity of these technologies to reach people beyond the doors of our campuses, in their homes, offices, and community centers.

What these two phenomena—society’s growing dependence on knowledge and the technological revolution in education—will ultimately mean for the organization and role of universities is a topic we have barely begun to understand. But it is clear that we need to look at the University anew in light of both the demands and the possibilities of a knowledge-based society.

UC as a collection of ten research universities

Such a knowledge-based society requires a university sufficiently large in scope to span the map of knowledge but flexible enough to respond to the economy’s shifting demands for educated people and the research necessary to keep productivity growing. What does this suggest for our vision of the University?

We envision UC as a collection of ten research universities—as a single but not a monolithic institution of ten campuses—not all identical and not all moving toward the same template. Just as Princeton and the University of Michigan are both research universities but clearly different in size, in the array of academic disciplines, and in the make-up of their professional schools, so the University of California’s campuses can be seen as variations on a single theme, each pursuing excellence in different ways.

What are the implications for the future of viewing UC from this perspective?

- Each campus will be differentiated, even at the level of individual disciplines. All campuses will have mathematics and history, for example, but not every sub-field. This is consistent with the philosophy that guided the creation of three new UC campuses in the 1960s, each distinctive in academic emphases, organization, and physical design. The idea was not to replicate Berkeley or UCLA but to develop new university options for the people of California. And the fiscal reasons are clear: prospects for State support are such that we cannot afford to offer the complete array of disciplines and subdisciplines, graduate and undergraduate courses, at every campus.

- There will be greater decentralization of authority from the Office of the President to the campuses. This, too, is consistent with trends in the University’s development since the late 1950s. At the same time, the Office of the President must play a leadership and coordinating role, as, for example, ensuring that all campuses comply with Universitywide policy and regulations, evaluating the quality of programs systemwide, and determining which fields to emphasize at which campuses. An example of the Office of the President’s role in setting systemwide academic priorities is UC’s engineering initiative. Business leaders have expressed their concern that unless this state produces more engineers, California companies cannot remain competitive. Our own studies have
substantiated this concern. In response, the Office of the President initiated a plan to increase significantly undergraduate and graduate enrollment in engineering and computer science programs across the UC system.

• The reciprocal of greater decentralization is greater accountability. Campuses will be held responsible for fulfilling campus and University-Universitywide priorities, while the Office of the President will concentrate on outcomes and monitoring accountability.

• The ratio of graduate to undergraduate students will vary from campus to campus, department to department, discipline to discipline. Traditionally this ratio has been driven more by the teaching and research needs of faculty than by the marketplace. In the future the marketplace will be a principal determiner of how many doctoral students we produce in various fields. Over the past several years we have been modifying our graduate enrollments in various disciplines as a function of student demand, market demand, societal need, and the ability to support graduate students. I do not mean to imply that the University's current graduate enrollments are too high; in fact the opposite is the case. The proportion of graduate students at the University has declined from 29.4 percent in 1960 to 17.8 percent today. To put these figures into perspective, it is useful to look at graduate enrollments at the eight universities with which UC compares itself for faculty salary purposes. As of 1993, the percentage of graduate and professional students at UC's public comparison institutions averaged 30 percent; the average for our private comparison institutions was 52.8 percent. It is clear that, at less than 18 percent, UC's graduate enrollments are far too low.

• To help the University maintain both quality and access, campuses have been given greater flexibility in how they use resources. Campuses have freedom to set campus priorities and deploy resources, but they also have to enter into an agreement with the Office of the President that reflects both university wide and campus-specific expectations.

Goals and initiatives

The purpose of these changes is to organize the University to carry out its missions of teaching, research, and public service in ways that capitalize on its strengths and that respond to society's demands for new knowledge and well-educated people. Meeting those demands will also require that we pursue the following goals and initiatives.

• The quality of the entire University enterprise depends on the quality of its faculty. UC's ability to recruit and retain the very best scholars and scientists is fundamental to its capacity to remain a great university.

• The University must be prepared to educate its share of the estimated 538,000 new students seeking a college or university education between 1994 and 2005—an increase in enrollment demand of 31 percent for California higher education generally. According to the California Educa-
tion Round Table, these figures translate to an enrollment growth rate two and a half times that expected for the nation as a whole. The shorthand term for this phenomenon is Tidal Wave II, and it is surely the single most significant issue facing higher education in this state. We estimate that UC will grow by about 45,000 students between now and the year 2010, with almost half of that expansion occurring before 2005. UC's planned tenth campus in Merced, which will open its doors in 2005, will help accommodate some of this additional demand.

- UC plays a critical role in research as it affects the well-being and economic vitality of California. We are not a job shop, and we will not compromise the quality, independence, or breadth of the University's research enterprise. What we will do is explore new forms of collaboration with industry to bring UC's tremendous intellectual resources to bear on stimulating productivity and economic growth. The UC Industry-University Cooperative Research program is an important step toward that goal. Its aim is to build partnerships with industry to mine the most promising research areas for new products and processes that will create jobs and prosperity for California. The doubling (from 12 to 24 percent) of the tax credit industries can claim for investing in university research makes this an especially auspicious time to expand research partnerships with industry. The tax credit encourages more industry investment in R&D generally; UC's cooperative research program targets specific, next-generation research in areas of California's greatest strength and opportunity. Together, they offer an historic opportunity to forge a strategy for California's economic preeminence into the next century.

- We must maintain UC's world leadership in the application of digital technology to problems of instruction. An incredible array of instructional technologies has been developed on each of our campuses, and we must continue to be a leader in this field. We want to be sure, too, that the K-12 schools are on the cutting edge of instructional technology. Toward this goal, we have mounted a systemwide initiative called UC Nexus to promote a statewide partnership between UC and the K-12 schools in encouraging high-quality teaching and learning through instructional technology. UC's role will be to help train and support teachers in the use of computers for instruction and curriculum development.

- The University will explore new paths to teaching and learning. Among these paths will be off-campus learning centers where students of all ages who do not want or need the residential campus experience can further their education. The Ventura Learning Center near UC Santa Barbara and our new UC Center in Fresno are examples. Another path will be closer linkages between the campuses and University Extension. The emergence of new professions, the restructuring of the workplace, and the transition to an information-based economy are requiring individuals to renew their skills continually. This means that today UC Extension is more important than ever: it offers continuing education to 500,000
Californians annually, at no cost to the State, and there can be no question about the excellence of its activities and their contribution to educating California's workforce. But I believe our view of Extension's potential has not been broad enough, and that this potential can be best realized by integrating Extension more closely into the University as a whole. A new initiative called the Master of Advanced Study is a step in that direction. This program offers professional education and liberal studies beyond the bachelor's degree at times and places that are convenient for working adults. Courses can be offered by UC academic departments in partnership with University Extension or independently, but in every case the curriculum will be supervised by regular faculty members, who will conduct a significant portion of the instruction.

Every university worthy of the name embraces a diversity of thought and opinion. As a public university in one of the most diverse states in the nation, the University of California has the further obligation of reflecting the mix of the state's population in the mix of its students, faculty, and staff. Both forms of diversity—a wide range of intellectual perspectives and a broad representation of California's population—are indispensable to our mission as a public university.

In enacting new policies on graduate and undergraduate admissions in July 1995, The Regents called for a task force on outreach to help establish new paths to diversity. The Outreach Task Force finished its work last year and The Regents approved its recommendations. To implement the Task Force's report, we have launched a major initiative called the Outreach Action Plan. We are committed to doubling our investment in outreach from $60 to $120 million a year. At the heart of the plan is a renewed partnership between the University and the K-12 schools. Implementation of the Outreach Action Plan is among the University's highest priorities.

Scholarship and teaching in a research university

The most important single contribution we can make to California—the one from which all others flow—is to keep the University intellectually vital. To accomplish this, we need a broad array of intellectual activity both in and across disciplines. Research is constantly exploring the boundaries between what we know and what we do not know. Sometimes the pace of discovery is greater in one discipline or era than in another, as in the blossoming of art in fifteenth-century Florence or the revolution in physics early in this century. But the exploration of all domains of knowledge is the daily business of the University. As one scholar has put it, lyric poetry and magnetic resonance imagery may be very different, but both are ways of giving us access to information that would be otherwise inaccessible. We do not expect every faculty member to win a Pulitzer Prize or become a Nobel Laureate. We do expect every faculty member to be engaged in innovative and intellectually challenging work.
And part of that innovative and intellectually challenging work is educating undergraduates. As a research university—not a research institute—we regard students as indispensable to everything we are and aspire to be. Given public perceptions about the academic performance of American students and the problems of American schools, it may come as a surprise to some that the students who enroll in the University today are the best prepared in history. These students are entrusted to us during what is, for many of them, one of the most critical and intellectually passionate periods of their lives. The process of education should help them focus their curiosity and enthusiasm and bring them into contact with the rigor and objectivity that are essential to the life of the mind. A research university, which is full of bright individuals with their own passionate commitments to learning, is a wonderful place in which to pursue such an education.

Much has been said about the notion of a core curriculum—a specific body of knowledge every student should master. Everyone has a different prescription for what the core curriculum should include. I am less committed to a core set of ideas. Rather, I prefer the Aristotelian approach that stresses some knowledge of several areas and deep experience in at least one. My conclusion after many years on the San Diego campus—where five undergraduate colleges offer five core curricula, all different, all rigorous, all intellectually demanding—is that there are many equally valid curricular paths to intellectual growth.

What is ultimately going to matter to students when their college years are over is not the particular books they read or the specific curriculum they followed but the cognitive skills they acquired. An in-depth knowledge of a particular subject is essential to knowing how to do something—to make a life's work. To master knowledge in one domain is also to master the grammar of learning, the intellectual and problem-solving skills that can be applied to learning virtually anything. Every student who possesses this grammar has the foundation on which future learning can be built. The shorthand term for this broad intellectual preparation is a "liberal education." Such an education clearly includes the quantitative skills associated with the natural and social sciences. And it just as clearly includes the ability to communicate and to create meaning that we associate with the humanities and the arts.

In my judgment there have been remarkably thoughtful dialogues in the University of California about improving undergraduate education. Many of the results of these dialogues have been impressive. Our undergraduates have the opportunity to engage in supervised research and to learn in an environment of discovery from professors who are on the cutting edge of new developments. Those students who can thrive on its demands find that UC offers unrivaled opportunities for learning. Students graduating from UC leave with a superb intellectual foundation and they make a contribution to this state precisely because they are so well educated.

One of the criticisms often leveled at research universities is that they do not adequately reward the faculty for excellent teaching. The report of UC's Universitywide Task Force on Faculty Rewards emphasized the importance of recognizing "the scholarship of integration, application, and teaching" as well as
"the scholarship of discovery." Furthermore, academic career rhythms are not uniform, nor is the relationship between research and teaching the same in different disciplines. The Task Force recommended that criteria for advancement be flexible in allowing faculty to shift emphases on teaching and research over the course of their careers. We need this kind of flexibility not just for the sake of our faculty but also for the sake of our students, who deserve exceptional teachers and teaching.

Concluding remarks

The University of California is an $11.5 billion-a-year enterprise. The State of California contributes about two billion of that $11.5 billion, which means that for every dollar the State provides we generate almost five dollars in other funds. One reason is that UC is a major recipient of federal research dollars, attracting over 10 percent of all federal funds spent on research in American universities.

Because of its extraordinary size and unparalleled strengths in teaching, research, and public service, the University of California is a major contributor to the well-being of the state and the nation. The University's future, therefore, matters far beyond our campuses and research stations. What can we say about where UC is headed?

Externally, the University is moving towards closer integration with society because of the tremendous potential of knowledge to leverage economic growth and to improve the quality of life for Californians. Internally, the University is moving towards greater autonomy for individual campuses and new ways of providing education and performing research. Another way to put it is that the future is drawing the University of California in two seemingly contradictory directions. One direction is towards greater diversity and decentralization as a strategy to use our resources most effectively. The other direction is towards greater unity as a result of the revolution wrought by the marriage of computers and telecommunication, which is opening up new learning technologies and expanding exponentially the boundaries of the university.

The search for knowledge will remain at the center of everything we do at the University of California. But the UC of the twenty-first century will be more geographically dispersed, more technologically linked, and more available to the citizens of California than ever before in its history.

The future of the University depends on our success in balancing the tensions and opportunities inherent in a ten-campus enterprise. This means realizing the possibilities of our unity as well as our diversity. In the past, thanks to a fortunate combination of leadership, circumstances, and determination, UC has been one of the most successful balancing acts in higher education. Our responsibilities in today's knowledge-based society require us to embrace the future with realism, intelligence, and a clear sense of the University of California's destiny as this nation's preeminent example of that vigorous American hybrid, the research university.

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Last Gasp

I started 20/20 during the first week of August 2000, and turned to the tape recorder whenever I had the opportunity. It is now Labor Day weekend, the academic year is about to go into high gear, and my enthusiasm for this project has diminished to near zero. In reading over the transcript, it's clear that this document needs to be placed in a file drawer and not see the light of day until after I step down as president.

On October 1, my fifth anniversary as president, I will issue a report to The Regents reviewing the five-year period. The plan is to organize the report around the ten goals I announced on being appointed president and to examine the progress that has occurred. Also, on my Web site (http://www.ucop.edu) are 49 speeches, op-ed pieces, and other reports. I hope that 20/20, the five-year review for The Regents, and the material on my Web site will provide a perspective on this period in UC history.

There is a long list of topics that I have not commented upon. The most glaring omission is a discussion of The Regents’ resolution, SP-1, the elimination of affirmation action. In my five-year report to The Regents, I will review our outreach efforts and the various programs that have been established to upgrade the teaching skills of K-12 teachers. Prior to the Regents' adoption of SP-1, the UC System was spending about $50 million in State funds on outreach and related K-12 activities; next year the expenditures will be approximately $230 million. We have made great progress with our outreach programs and I'm proud of what has been accomplished. With modifications in our admission process and more focus on
community college transfers, I believe that over the next several years our efforts will begin to produce more diversity among our students. However, it will not occur quickly and in the meantime we will be at political risk.

After I step down as president, I'll give my account of the events surrounding SP-1 and explain why I delayed implementation of The Regents' resolution by one year. Some have asserted that I failed to properly consult with The Regents and Governor Wilson on the decision to delay. Indeed, there was a call for a special meeting of The Regents to "review the performance of the president" that was widely reported in the press. Fortunately, saner heads prevailed.

To implement SP-1 on the time schedule specified by The Regents would have been disastrous. There were too many technical and logistical problems that had to be solved before an orderly transition could occur. The administration and the faculty failed to give The Regents clear advice about the effects of SP-1 and the unrealistic time schedule proposed. The vote on SP-1 was ill advised; can anyone doubt that it was politically timed as a prelude to Proposition 209?

Another topic not discussed was the implementation in the summer of 1996 of a new methodology for allocating State funds to each of the campuses. I first presented my plan in a rather unorthodox way. It was summarized on a sheet of paper by an array of handwritten mathematical equations (to be exact, finite difference equations). The one-pager was an attention-catcher and generated a great deal of discussion. It was circulated widely and while I no longer have a copy, I'm sure that one exists in a file cabinet somewhere in the University. The details are too complicated to review here, but the goal was to give the campuses greater
flexibility and responsibility for how funds were expended. Successful entrepre-
neurial efforts were to be rewarded and funds were to be returned to the campuses
on the basis of how they were earned (e.g., indirect costs on federal and private
research grants). There were historical inequities among the campuses that were
addressed by this new methodology.

I was pleasantly surprised that the chancellors, the academic senate, and
The Regents so readily accepted the rationale for change and agreed that we should
implement the new methodology with the following year's budget. This methodol-
ogy represented a major change in the way the University does its business.

Our State budgets for the last five years have been exceptionally good. The
budgets for the preceding five years (1990-1995) in many ways were the worst in
UC history. David Gardner, in the early years of his presidency, had several
excellent budgets that did a great deal to rectify some of the cuts that occurred
while Jerry Brown was governor. But the budgets in his last two years and the
three budgets during Jack Peltason's presidency were disastrous; even during the
Great Depression, UC did not suffer cuts as severe as those imposed between 1990
and 1995.

The recession that led to these budget cuts ended as I became president, and
I have enjoyed a span of five budgets unmatched in the history of UC. The Califor-
nia economy has been remarkably good and every year State revenues have broken
new records. Governor Davis deserves special praise. He has gone far beyond what
was necessary politically to ensure the continued excellence of UC.
What follows is a list of topics that I have not discussed but that deserve attention in surveying these last five years.

- State support for three California Institutes of Science and Innovation
- Establishing the Center for Teaching and Learning Technologies to facilitate the development of Web-based systems to support our educational programs
- Restructuring and greatly expanding UC's outreach programs and the development of summer institutes to upgrade the teaching skills of K-12 teachers
- Establishing the Commission on the Humanities to examine ways of strengthening these fields throughout the UC system
- Establishing the California Digital Library, which is now unparalleled in the nation
- Catastrophic consequences of creating UCSF-Stanford Health Care in 1997 and Stanford's withdrawal in 1999
- Opening California House in London to facilitate our overseas programs
- Establishing a new degree--Master of Advanced Study--for part-time students seeking an advanced degree in any of our academic programs
- Initiating UC Merced and recruiting its first chancellor
- Establishing the President's Commission on Agriculture and Natural Resources to build closer relations between the agricultural community and UC
- Unionization of teaching assistants
- Doubling of total private giving to the UC campuses over the last five years to approximately $1.2 billion
- Awarding health care benefits for domestic partners
- The design and deployment of CalREN-2
- Awarding fourteen Presidential Medals; the medal was established in 1997 so that the president can recognize contributions to UC or to the community of learning
- Planning and construction of the UC Washington, D.C., Center to house 280 students and various UC programs
- Change in the reporting relationship of the UC Treasurer from The Regents to the president
- Security issues at the Los Alamos National Laboratory and problems with NIF at Livermore
- Development of the Mission Bay campus of UCSF
- The governor's request that I chair an advisory group to address the issue of disposal of California's low-level radioactive waste
- Establishing the Institute for Labor & Employment with a State budget augmentation in this budget year of $6 million

Most of the entries on this list represent progress for the University, but several have had negative consequences of major proportion. The UCSF-Stanford
Medical Care merger was costly and was mismanaged by the executives of the corporation that was established to operate the merged hospitals. Even now, at the end of August 2000, the magnitude of losses for UCSF and for Stanford are still not fully known, but they will be much greater than anticipated when Stanford abruptly withdrew from the merger. In hindsight, the merger was a mistake. At the time, however, an army of experts and consultants reviewed and analyzed every detail of the plan and were overwhelmingly in favor of moving forward. Further, UCSF Chancellor Martin (who left for Harvard shortly after The Regents approved the merger) and Stanford President Casper were adamant that we must proceed. At a later time, I will have more to say about this sad episode.

Another topic on my list of issues is the "spying" incident at Los Alamos. I placed quotation marks around the word "spying" because even now at this late date, after endless investigations by the Department of Energy and the FBI, there is no evidence that national security was ever compromised. A steady stream of news leaks from DOE tried to place blame on UC's management of Los Alamos, but as more facts emerged the University's standing with the congressional oversight committees has improved. The congressional decision to establish the National Nuclear Security Administration and the subsequent appointment of General Gordon as its director are steps that I consider favorable to the University. I anticipate that before the November 2000 election, UC will sign a five-year extension of our contract to manage the laboratories.

UC has managed the laboratories since their inception during World War II, and our involvement has been critical in the recruitment of first-rank scientists and
engineers. Without UC's presence, the labs would have been like too many other federal laboratories and the quality of science would have suffered. The labs have played a decisive role in the cold war and, in the future, will be critical in dealing with nuclear threats and biological terrorism. UC's continued management is in the best interest of this nation and the world—a strong statement but one that is justified by the historical record.

Yet another issue on the above list is the University's difficulties with organized labor. For some years the relationship between UC and our unions has been contentious, and this history was one of the factors that influenced graduate teaching assistants to vote for collective bargaining this past year. The newly formed Institute for Labor and Employment, jointly located at Berkeley and UCLA, is a step towards establishing better relations between UC and the union leadership in California. Our intention is to develop a program of research and teaching that will be academically distinguished and, at the same time, prove valuable to the state on policy issues. To a certain extent, the conflict between UC and its unions is inevitable, but hopefully it will be more muted in the future. With a Democratic governor and Democratic legislature, it is incumbent on the University to improve its relationship with organized labor.

Time has run out. It is now Labor Day and I have no intention of continuing with this project. I have not discussed: the changing demographics of the State of California and its implications for UC; my commitment to shared governance; the
superb quality of undergraduate education that exists on every one of the UC campuses; my reservations about the SAT; the role of The Regents in the affairs of the University; proposed changes in UC admissions procedures that I plan to unveil next month; and many other topics. All for another time.

For the last year or so, I have been signing my letters to members of the University community with the phrase “Fiat Lux” rather than “Sincerely yours.” For now, Fiat Lux.
<table>
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<tr>
<th>DATE</th>
<th>EVENT</th>
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<tr>
<td>Aug. 1995</td>
<td>Richard C. Atkinson appointed seventeenth president of the University of California, effective October 1, 1995.</td>
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<td>Oct. 1995</td>
<td>National Research Council releases &quot;Research-Doctorate Programs in the United States,&quot; a comprehensive study of the quality of Ph.D. programs in American universities. UC as a system did remarkably well, with more than half of its 229 graduate programs ranked in the top 20 in the nation. When averages were computed for individual universities, Berkeley ranked first in the nation, San Diego tenth, and Los Angeles twelfth; the other nine institutions in the top twelve were all private universities.</td>
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<td>Oct. 1995</td>
<td>Three UC faculty awarded the Nobel Prize: Frederick Reines (Physics, Irvine), F. Sherwood Rowland (Chemistry, Irvine), Paul Crutzen (Chemistry, San Diego)</td>
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<td>Dec. 1995</td>
<td>William H. Gurtner appointed Vice President, Clinical Services Development.</td>
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<td>Mar. 1996</td>
<td>C. Judson King appointed Provost and Senior Vice President, Academic Affairs.</td>
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<td>Mar. 1996</td>
<td>Regents authorize construction of headquarters in Oakland for the Office of the President.</td>
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<td>Apr. 1996</td>
<td>M.R.C. Greenwood appointed sixth chancellor of UC Santa Cruz.</td>
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<td>Apr. 1996</td>
<td>Robert C. Dynes appointed sixth chancellor of UC San Diego.</td>
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<td>June 1996</td>
<td>UC and the Los Alamos National Laboratory establish an office in Northern New Mexico to strengthen relationships with regional communities.</td>
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<td>Aug. 1996</td>
<td>President Atkinson announces a new methodology for allocating State funds to the campuses. Among the changes are: most allocations to the</td>
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campuses to be made as a single block of funds; indirect cost reimbursements to be returned to the campuses on the basis of how the dollars are generated; campuses to assume greater flexibility and responsibility for how funds are spent.

Aug. 1996  Commission on the Future of Medical Education appointed (Charles Wilson, M.D., chair).

Sept. 1996  Robert N. Shelton appointed vice provost for research.

Oct. 1996  Bruce B. Darling appointed Vice President, University and External Relations.

Oct. 1996  Davis and Irvine campuses invited to join the Association of American Universities, bringing UC's membership to six campuses; the only university system in the nation with more than one AAU member.

Jan. 1997  President Atkinson establishes the UC Flood and Emergency Resource Task Force to assist the state in dealing with natural disasters.

Jan. 1997  President's Retreat on UC's Relationship with Industry in Research and Technology Transfer held at UCLA.

Jan. 1997  Carol Tomlinson-Keasey appointed vice provost for academic initiatives.


Mar. 1997  Albert Carnesale appointed fifth chancellor of UCLA.

Mar. 1997  All-University Conference on Teaching and Learning Technologies held at UCLA.

Mar. 1997  President Atkinson announces his intent to introduce a computerized version of the Universitywide Subject A Examination.

Mar. 1997  *New York Times* refers to the emergence of UC San Diego as a major research university, which had a great impact on the economy of the San Diego region, as the "Atkinson Miracle."

Apr. 1997  Presidential Medal awarded to UC benefactor Peter E. Haas, Sr.

Apr. 1997  President Atkinson establishes the Board on Research and Economic Development, a group of distinguished representatives from the private sector, to advise on future directions of the Industry-University Cooperative Research Program.

May 1997  Outreach Task Force issues draft report.

May 1997  Regents approve Mission Bay site for major expansion of UC San Francisco.

May 1997  UC joins with Caltech, the California State University, the California Institute of Technology, Stanford University, and the University of Southern California in establishing the Consortium for Education Network Initiatives in California (CENIC) to design and deploy CalREN-2, an advanced electronic superhighway that will link California's universities to the national high-speed network.

May 1997  UC and its affiliated national laboratories produce more research leading to patented inventions than any other public or private research university or laboratory in the nation, according to a study by the National Science Foundation.

May 1997  Presidential Medal awarded to UC San Francisco Chancellor Joseph B. Martin, M.D.

May 1997  Presidential Medal awarded to UCLA Chancellor Charles E. Young.

June 1997  Hugh Graham presentation to The Regents on his study (with Nancy Diamond), The Rise of American Research Universities, which found that the UC system leads the nation in research excellence and productivity among public universities.


July 1997  UC and Mexico's National Council on Science and Technology (CONACYT) enter into the most comprehensive research and education collaboration ever established between a U.S. university and Mexico.
Sept. 1997  Presidential Medal awarded to Los Alamos Laboratory Director Siegfried Hecker.

Sept. 1997  Judith Boyette appointed Associate Vice President–Benefits and Human Resources; reorganization of the merged benefits and human resources departments begins.

Sept. 1997  Regents approve five-year extension of UC's contracts to manage the Department of Energy Laboratories at Los Alamos, Livermore, and Berkeley.

Sept. 1997  Regents approve creation of UCSF Stanford Health Care, a merger of the clinical enterprises of UC San Francisco and Stanford University, to sustain the competitiveness of both in the changing health-care marketplace.

Oct. 1997  Two UC faculty awarded the Nobel Prize: Paul D. Boyer (Chemistry, UCLA), Stanley Prusiner (Physiology or Medicine, UCSF)


Oct. 1997  UC Digital Library established and Richard Lucier named as University Librarian.

Nov. 1997  Pathways, UC's online undergraduate admission information and application network, begins accepting applications.

Nov. 1997  Faculty committee releases academic planning recommendations for UC's tenth campus.

Nov. 1997  Regents approve health benefits for domestic partners of UC faculty and staff.

Nov. 1997  Regents approve 1616 Rhode Island Avenue, NW, Washington, D.C., as the site for the UC Washington, D.C. Center. The UC Center will provide space for academic program and research activities and the Office of Federal Governmental Relations, as well as housing for 280 students.
Dec. 1997  President Atkinson approves naming of 10th campus "UC Merced."

Dec. 1997  UC Santa Barbara's school of environmental studies is renamed the Donald Bren School of Environmental Science and Management in recognition of a major gift from the Bren Foundation. The Bren gift supports establishment of the University's first intercampus program of environmental study integrating natural and social sciences, business and law curricula.

Jan. 1998  Outreach Action Plan announced at Regents' meeting.

Jan. 1998  Chancellor Emeritus Pister appointed Senior Associate to the President to coordinate UC's systemwide response to the recommendations of the Outreach Task Force Report.

Jan. 1998  For the third consecutive year, UC raises a record amount in contributions from alumni and friends, receiving $726.3 million in 1996-97.


Jan. 1998  UC announces applications from nearly 59,000 high school seniors for admission in fall 1998, an 8 percent increase from the previous year and the largest one-year jump in 10 years.

Feb. 1998  President Atkinson announces title changes for Anne C. Broome (Vice President, Financial Management) and Larry Hershman (Vice President, Budget).

Mar. 1998  President Atkinson appoints the President's Commission on Agriculture and Natural Resources, a group of agricultural, business, consumer, and governmental leaders charged with advising UC on issues related to agriculture and natural resources.

Mar. 1998  Organizational plan for the newly merged UCOP Human Resources and Benefits Department announced.

Apr. 1998  J. Michael Bishop appointed eighth chancellor of UC San Francisco.

Apr. 1998  Carol Tomlinson-Keasey, Vice Provost for Academic Initiatives, given additional appointment as Senior Associate to the President for UC Merced.
President Atkinson and the University's chancellors meet with members of the California Congressional delegation and federal officials in Washington, D.C., to discuss issues of mutual interest.

Presidential Medal awarded to President Emeritus Clark Kerr.

Presidential Medal awarded to George Deukmejian, former governor of California.

A. Scott Sudduth appointed Assistant Vice President--Federal Governmental Relations.

President Atkinson announces the UC Engineering Initiative, a plan to help keep California’s technology-based economy competitive by a 50 percent increase in the number of engineering and computer science students at UC 2005.

Office of the President relocates to 1111 Franklin Street, Oakland, California.

Presidential Medal awarded to Irvine Chancellor Laurel L. Wilkening.

President Atkinson announces the Master of Advanced Study, a new systemwide degree program offering advanced professional education and advanced liberal studies for working adults.

Two UC faculty and one UC researcher awarded the Nobel Prize: Louis J. Ignarro, (Physiology or Medicine, UCLA), Walter Kohn (Chemistry, UCSB), Robert B. Laughlin (Physics, Livermore).

Governor-elect Gray Davis appoints President Atkinson to his Education Transition Group.

President Atkinson announces search for founding chancellor of UC Merced.

Governor Davis appoints President Atkinson as a member of the Governor’s delegation to visit Mexico to strengthen relationships in commerce and education.

Presidential Medal awarded to Willie Lewis Brown, Jr., Mayor of San Francisco.
Mar. 1999  Governor Davis appoints President Atkinson to the Commission on Building for the 21st Century, charged with developing a comprehensive plan for meeting California’s infrastructure needs.

Mar. 1999  Regents approve changes in freshman eligibility that make the top 4 percent of graduates from all California high schools eligible for admission to UC.

Mar. 1999  President Atkinson establishes the California Studies Fellowship program at the universitywide Humanities Research Institute to support research and scholarship on the history and culture of California. Four inaugural fellows selected for 1999-2000.

Mar. 1999  California House, jointly sponsored by UC and the California Trade and Commerce Agency, established in London to stimulate academic and commercial exchange between the United Kingdom and California.

Apr. 1999  President Atkinson and the University's chancellors meet with members of the California Congressional delegation and federal officials in Washington, D.C., to discuss issues of mutual interest.

Apr. 1999  Presidential Medal awarded to former UC San Francisco Chancellor Haile T. Debas.

May 1999  The Koret Foundation awards President Atkinson and Stanford University President Gerhard Casper the Koret Prize for preeminent contributions to American education.

May 1999  Presidential Medal awarded to the President of Mexico, Ernesto Zedillo Ponce de León.

May 1999  President Atkinson announces plans to establish the University of California Commission on the Humanities to examine the challenges the humanities and humanities scholars face in higher education and recommend ways to address them.

July 1999  Carol Tomlinson-Keasey appointed founding chancellor of UC Merced.

Oct. 1999  UC Medical Student Diversity Task Force appointed to examine short and longer-term trends in the admission and enrollment of underrepresented minority students at UC medical schools.
Oct. 1999  President Atkinson announces creation of the position Vice President-Educational Outreach to strengthen oversight of UC's growing outreach and K-12 programs and appoints Karl S. Pister to the post.

Oct. 1999  Pierce's Disease Task Force established to mobilize the University's scientific and technical expertise to help combat Pierce's disease, a threat to the state's wine and grape industries.


Nov. 1999  Regents authorize President Atkinson to take the necessary steps to dissolve UCSF Stanford Health Care.

Dec. 1999  President Atkinson establishes in the Office of the President the Center for Teaching and Learning Technologies to coordinate both campus and universitywide efforts to develop various digital approaches to education, including e-learning.


Feb. 2000  President Atkinson designates Veterans Day (November 11) as an official University of California holiday.

Mar. 2000  Presidential Medal awarded to Sidney Drell, former chair of the University of California President's Council on the National Laboratories and professor of physics at Stanford University.

Mar. 2000  Michael Drake appointed Vice President–Health Affairs.

Mar. 2000  Alex Saragoza appointed Vice President–Educational Outreach.

Mar. 2000  Joseph Mullinix appointed Senior Vice President–Business and Finance.
May 2000  Cerro Grande fire near Los Alamos National Laboratory destroys over 200 residential dwellings and requires closing of the Laboratory from May 8 - May 22.

May 2000  Two hard drives containing classified information about disarming nuclear weapons discovered missing at the Los Alamos National Laboratory.

May 2000  Regents approve change in title for Bruce B. Darling to Senior Vice President–University and External Relations.

May 2000  Julius Zelmanowitz appointed Vice Provost for Academic Initiatives.

May 2000  Governor Davis and UC confirm new partnership agreement to provide the University with a four percent annual increase in State general funds, plus support for enrollment growth and other key areas.

June 2000  Missing hard drives found at Los Alamos National Laboratory.

June 2000  Presidential Citation of Excellence awarded to Director of Personnel Edna Coleman-Smith.

June 2000  UC receives an 18 percent operating budget increase in the 2000-01 State budget approved by Governor Davis. Capital budget includes $75 million to create three California Institutes for Science and Innovation, which will focus on scientific and engineering research and teaching in fields key to the future of the California economy.

July 2000  Six finalists for California Institutes for Science and Technology announced:
- Systems Biology (UC Irvine)
- Agricultural Genomics (UC Riverside, UC Berkeley, and UC Davis)
- Communications and Information Technology (UC San Diego and UC Irvine)
- Nanosystems (UC Los Angeles and UC Santa Barbara)
- Information Technology in the Interest of Society (UC Berkeley, UC Santa Cruz, UC Davis, and UC Merced)
- Bioengineering, Biotechnology, and Quantitative Biomedicine (UC San Francisco, UC Berkeley, and UC Santa Cruz)
Sept. 2000  Regents approve mandatory student health insurance for undergraduates, making UC the first multicampus university system to adopt a policy of mandatory student health insurance.

Sept. 2000  President Atkinson requests the Academic Senate to review a “dual admissions” proposal that would supplement current admissions procedures.


Sept. 2000  President Atkinson receives the National Leadership Award from the U. S. Small Business Administration for his role, as chancellor of UC San Diego, in forging industry-university-government partnerships that contributed to the economic revitalization of the San Diego region.

Oct. 2000  Three UC faculty awarded the Nobel Prize: Professor Alan J. Heeger (Chemistry, Santa Barbara); Professor Herbert Kroemer (Physics, Santa Barbara); and Professor Daniel L. McFadden (Economics, Berkeley).


Last updated October 19, 2000
I was pleased to accept Roger Hahn's kind invitation to participate in this colloquium series. It gave me an opportunity to rethink some events I was associated with at the National Science Foundation (NSF) in the 1970s. I would like to review briefly U.S. science policy since World War II from the perspective of the National Science Foundation, and in particular from the narrower perspective of science education and the social sciences at NSF. This is a personal account, not a scholarly one, and I would be delighted if my remarks were to stimulate some aspiring young historians to undertake a more careful study of the events I am going to discuss.

My story begins with World War II and the remarkable success of U.S. science in the war effort—a critical factor in our victory. President Roosevelt's science adviser, Vannevar Bush, had been a long-term member of the faculty at the Massachusetts Institute of Technology; he was one of the key people responsible for building the quality of that institution. Bush had a close personal relationship with Roosevelt. Near the end of the war the president asked him to define a plan for American science in the postwar period. That request led to Bush's landmark report, *Science, The Endless Frontier*, one of the great documents of American history. The Bush report defined science policy for the post-World War II era.

What was the nature of that report? No summary could do justice to Bush's masterful analysis, but essentially he made three principal arguments about the future of the U.S. scientific enterprise. First, he argued that most aspects of R&D were the responsibility of the private sector. But he also recognized that market mechanisms would discourage the private sector from investing adequate funds in basic research.
This led Bush to his second argument: ensuring support for basic research in the postwar period should be the responsibility of the federal government, because the enormous benefits to society at large justified the investment. He did not believe basic research should be conducted in government laboratories, however, but in the universities of the nation. As the institutions responsible for the nation's basic research, universities had pride of place in Bush's vision of the research enterprise. Third, he argued that decisions about which university research projects the government would fund should be made via a peer-review process. Bush envisioned a federal agency that would be responsible for funding these research activities. Legislation was introduced in 1945, but because of disagreements between the Truman administration and Congress, as well as within the Congress itself, the National Science Foundation was not created until May 1950. The events of this five-year period are nicely described in an excellent recent biography of Vannevar Bush by G. Pascal Zachary.

One of the debates surrounding that legislation involved the scope of the Foundation's proposed activities. Harry Truman was now president. His associates urged a broader range of responsibilities for the foundation than Bush's supporters did, one that included science education and the social sciences. Bush, on the other hand, had only minimal interest in including science education and no interest at all in including the social sciences. James Conant, a close colleague of Bush renowned for his reorganization of Harvard's general education curriculum, was a strong proponent of including science education on NSF's agenda. In the end, Conant's view prevailed. Science education became one of NSF's responsibilities. So did the social sciences, but without a clear mandate to fund them.

NSF got off to an extremely slow start, with minimal funding in the various sciences. There was a trickle of science education activities in the early years, but they were almost wholly confined to supporting fellowship programs for graduate students. Bush and many other leading scientists of that period felt NSF was not meeting their initial expectations, and viewed the agency as of little consequence.

The world changed in October 1957, when Sputnik was launched. The public response bordered on panic: there was much alarmed discussion of an education gap—an ominous disparity between the quality of American science education and its counterpart in the Soviet Union. Within a month the administration established the President's Science Advisory Committee (PSAC), which played a very important role in the Eisenhower, Kennedy, and Johnson administrations. Congress
responded with the National Defense Education Act, which dramati-
cally increased federal funding for student loan programs and graduate
fellowships in science and engineering, among other things. In the
post-Sputnik years, support for science climbed rapidly, and funding
for NSF took off. Gradually the activities in the social sciences
increased, until by 1968 legislation was introduced to change the NSF
Organic Act to require funding in these disciplines.

In particular, science education blossomed. NSF began offering
summer institutes for K-12 teachers, in which leading university sci-
entists met with teachers to discuss scientific developments and how to
teach them. Even more important were curriculum development
projects. Few people trusted the Office of Education to carry out this
responsibility; NSF was the agency everyone turned to. NSF started in
physics, with a curriculum developed by Zacharias of MIT, and a math-
ematics curriculum quickly followed. So did a program in chemistry;
faculty at UC Berkeley played an important role in developing the
chemistry curriculum. One can criticize these programs. They were too
difficult for the average student—too focused on the best students—
but the simple fact is that if you go anywhere in the world today, you
will find that these programs are still in use and are regarded as out-
standing curricula.

The curriculum projects went so well that NSF decided to be even
bolder. It ventured into the biological sciences and began to develop
and distribute biology courses to the high schools. Teachers were given
special training, and the curricula were widely used. Eventually these
curricula expanded to include topics on evolution, which brought out
the creationists in force. They criticized NSF's involvement both as
undermining religious beliefs and as a federal intrusion into local
authority. But the loudest outcry was reserved for a social science cur-
riculum called Man: A Course of Study (MACOS). MACOS was de-
developed under the intellectual leadership of Jerome Bruner, who was at
Harvard at that time.

MACOS focused on cultural diversity, principally from an
anthropological viewpoint, and was aimed at students in grades seven,
why, and nine. One of the films produced for the course told the story
of an Eskimo village above the Arctic Circle. Among the Eskimo prac-
tices depicted in the film was the custom of borrowing someone else's
wife to keep you warm on a long journey across the ice if your own
wife was not well enough to accompany you. Another was the practice
of abandoning grandparents on an ice floe when they became too old to
contribute. MACOS succeeded brilliantly in demonstrating cultural
differences; it was equally effective in arousing public outrage. There
were protest rallies, public meetings at schools that adopted MACOS, and vitriolic editorials—Jim Kilpatrick wrote extensively on the damage MACOS was inflicting by undermining the moral character of America's young people.

Around this time Senator Proxmire began presenting Golden Fleece awards for instances of government fraud, waste, or abuse. An early award went to the Air Force for spending $2,000 per toilet seat for bombers. But soon Proxmire's interest shifted to NSF, and the agency became a perfect target. One of the early awards was a Golden Fleece for a research grant entitled "The Sexual Behavior of the Screw-worm Fly." Proxmire got tremendous attention for that; I'll return to it a little later.

When he delved into the social sciences, he found an NSF-supported grant dealing with an experimental analysis of love from a social/psychological perspective, and another grant concerned with a theory of love. At that time the National Enquirer was paying a $500 bounty to freelance reporters who came up with a story of this sort, and many writers would just scan the titles of research projects supported by NSF. The Chicago Tribune had a field day with the theory of love grant, and as if this weren't bad enough, they found a project titled "A Theory of Necking Behavior." We tried in vain to find this grant on NSF's list of social science projects. Days later we finally unearthed it among the engineering projects—the necking referred to was of a metal, not a human, variety.

Several of the faculty grantees who were recipients of the Golden Fleece wore it proudly as a badge of merit and made the most of their notoriety on the Johnny Carson show. This was serious business for NSF, however, because it played havoc with the Foundation's public image and relations with Congress.

This is where my story begins. I came to NSF on 1 July 1975. Guyford Stever, director of NSF at the time, had been a long-term professor of physics at MIT and later president of Carnegie-Mellon University, as well as having served as an aide to Vannevar Bush during World War II. He had landed at Normandy on the second day of the invasion to seek out and investigate V-2 sites. The beach commander told his group that such a site had been liberated thirty miles up the road. When they arrived, they found the report had been a bit premature—the site was still occupied by the Germans. The German commander seized the opportunity to surrender, however, and all ended well. Newspaper reports established Stever as a national hero.

I was recruited by Stever to be the deputy director of NSF. I had never had any interest in administration as a university professor, and
frankly had a rather low regard for academic administrators—university presidents included. But the prospect of spending some time in Washington, D.C., was appealing to both my wife and me, particularly since our daughter was due to go off to college that fall. Why, one might ask, was I chosen by the people at NSF? I had a good relationship with the Kennedys; I had worked on Robert Kennedy’s presidential campaign, and Senator Ted Kennedy was the chairman of NSF’s Appropriations Committee. Even though I was a social scientist, I worked on mathematical problems, had been featured in *Life* magazine for having developed computer-based systems for education, and was a member of the National Academy of Sciences. I was not a hard scientist, but my pedigree was not too suspect. Guy Stever proved to be a persuasive recruiter and so I joined NSF on a two-year leave from Stanford.

At this time considerable criticism was being directed toward science activities of all sorts. Ever since the publication of Rachel Carson’s *Silent Spring* in the 1960s, there had been a growing feeling abroad that the purity of science, as it had emerged from World War II, was not quite as pure as it had seemed. This was immediately after the Vietnam War and there were sizable cuts in science budgets; money was hard to come by and scientists whose grants were not funded were critical of peer review and in turn of NSF. Proxmire was tapping into this public unease about science, and Congress followed his lead. During the winter before I came to NSF, two congressmen—John Conlan of Arizona and Robert Bauman of Maryland—were particularly severe critics. They introduced a series of bills eliminating science education from NSF. Bauman had one bill that would have required every grant from NSF to be reviewed by Congress; it passed the House and it was only thanks to the conference committee that the requirement was eliminated. The Congressional Record for that period is replete with speeches by senators and congressmen targeting NSF for criticism.

The criticism of science education programs became so intense that Stever wrote to Congress in March announcing his intention to establish an in-house group to review NSF’s science education programs and to assess the criticisms that had been leveled at them. The group, which included some longtime insiders at NSF, was chaired by Bob Hughes, a new presidential appointee who served as one of the Foundation’s assistant directors. Hughes had a very heavy travel schedule, so his personal involvement in the study was limited.

The Hughes report was published a few days before I arrived at NSF, and it was the first thing I read. The report did not deal with the philosophical criticisms of NSF. Instead, it discussed NSF’s business dealings and the appropriateness of its peer-review procedures as they
applied to NSF curriculum projects. The report made a persuasive case that NSF had done its business in an orderly and thoroughly appropriate way, and I finished it convinced that the cloud of criticism hovering over NSF would soon be dispersed.

A few weeks later I was asked to testify on the Hill about the peer-review process as it was used throughout NSF. Director Stever was on a trip to Russia, so I went solo on my first appearance before Congress as a member of a federal agency. The chair of the committee was James Symington, son of the former senator Stuart Symington. He was sympathetic to NSF and many years later characterized his experience and the events associated with NSF's science education programs as comparable to his famous father's experience with Senator Joe McCarthy. Bauman and Conlan entered the room shortly after I started my testimony and immediately accused NSF of having produced a report that was "a pack of lies." We were deliberately misleading the Congress, they charged. I was stunned; there had never been criticism like this. When Stever returned from Russia, he joined me at the next peer-review hearing, where the same accusations were repeated. Finally Stever responded in exasperation that we had done our very best to examine these matters, and if the Congress didn't think we had done a thorough job, it should call for a General Accounting Office (GAO) investigation. After the hearing ended, Symington suggested that such an investigation would surely silence the critics. Stever agreed, and so that summer the Congress initiated a GAO investigation.

The fall passed with hardly a mention of the GAO investigation. One Friday in early January, I received a call from Symington, who said he wanted to see me at three o'clock. When I arrived at his office, Symington was alone, with a stack of documents on his desk. One was the GAO report, sent first to him as 'the committee chairman. He told me to read the executive summary. My heart beat quickly as I scanned it. Then he handed me a press release, which he told me to read and change as I saw fit. The press release, he informed me, would be issued before I left his office. He wanted to be sure that Conlan and Bauman didn't get a jump on him and release the news before he did. The news, needless to say, was very bad indeed.

I got in touch with Stever as soon as I could. It was about six and he was in a tuxedo, about to go to a White House dinner for the president of France. We decided to assemble a group to examine the GAO report. Time was of the essence. I pulled together a small investigative team of people whom I had gotten to know at NSF and whom I trusted; none of them had served on the Hughes committee. By nine that evening we had sequestered the relevant files and were hard at
work. We worked all night Friday, all day Saturday, and Saturday night as well. On Sunday morning I called Stever and went to his house in Georgetown. I explained to him that our investigation had made it clear that the GAO report was not only correct, but had merely scratched the surface. Matters were even worse than the GAO portrayed them. We spent several days in despair, struggling to decide what to do. My view was that we had to reveal everything as quickly as possible; others thought we should tough it out. A few days later, Stever met with Rice University president Norman Hackerman, chair of the National Science Board (NSB), the presidentially appointed oversight board of NSF. Stever explained the problem to him, and the two of them then asked me to outline a plan for dealing with the situation. I did so, and was told that afternoon to proceed without delay—to get the whole story out, and quickly.

What did the GAO report say about our science curriculum projects? 1. NSF engaged in poor business practices. 2. It failed to do appropriate audits. 3. There were some inappropriate expenditures of funds. None of this was criminal, but it was clear that the Foundation was doing a less than effective job. Many of these projects had gone on for more than six years with little effort to assess their quality or effectiveness. A particularly difficult criticism was that the curriculum programs often involved major commitments of funds—so much so that they had to go for final approval to the National Science Board. Yet the peer reviews sent to the NSB were redacted by program officers so that they were highly selective, emphasizing positive assessments and deleting negative ones.

Why did the Hughes group fail so badly? Hughes is a fine individual and a distinguished chemist, who has been an important contributor to science policy. But he was a new presidential appointee with an incredibly heavy workload and travel schedule. He did not have time to monitor the committee’s activities on a day-to-day basis or involve himself in a detailed analysis of the relevant documents. Unfortunately, some of the staff on the Hughes group conspired among themselves to cover up the problems. And how did Conlan and Bauman know what was going on? They had two people inside the NSF who were keeping them informed daily. A few years later one of Conlan’s aides remarked that they knew within hours after an NSF staff meeting exactly what had transpired.

NSF’s response to the GAO report proved to be very effective. Our candor stunned the Congress and took the wind out of our critics’ sails. We acknowledged the faults in our procedures, the questionable character of our business practices, and the inappropriateness of some
of our expenditures. Two individuals were placed on administrative leave and one was later terminated. We restructured the science education programs, revised our policies, and recruited new leadership. There is an account of these changes in various NSF news releases and reports issued at that time.

We also changed the peer-review process throughout NSF. The program officers had, and still have, great flexibility. They solicit peer views for a given proposal, and then use the information—as they judge appropriate—to decide whether or not to fund the project. Program officers should have that kind of decision-making authority, but there is also a need for oversight. Accordingly, we established an audit office that did random samples of peer reviews to ensure that they were being used appropriately.

In addition, we changed the procedure for soliciting peer reviews. Reviewers, in the past, had been told that applicants could request a copy of their review, but that the review would be redacted to protect the identity of the reviewer. Redaction proved to be a serious problem in the GAO report and more generally throughout the Foundation. Too many errors were made in the process (especially when many reviews had to be redacted), compromising the entire peer-review system. Accordingly, we told reviewers that in the future their reviews might be shared with applicants, and that they should write them in a way that protected their anonymity. Reviewers quickly adjusted to this procedure and redaction was no longer necessary.

We also began to edit titles and abstracts of proposals to avoid the kinds of problems we had with the National Enquirer. This proved to be necessary only on rare occasions, but the very idea created a stir in the academic community. How dare you edit our work? was a common reaction. I don’t know whether they still do this at NSF, but in my day it was useful in preventing reporters from misrepresenting the true nature of a research project.

In the summer of 1976, Stever resigned to become science advisor to President Ford. Nixon had fired his science advisor, Ed David, and had abolished PSAC in 1973. He was unhappy with the academic community in part because of its anti-Vietnam War activities. Nelson Rockefeller, Ford’s vice president, believed that PSAC had played an important role in the past and should be reestablished, but with congressional legislation this time. That took a while, however, and in the summer of 1976 Stever became the director of the newly established Office of Science and Technology and I became acting director of NSF.

The next few months were possibly the most interesting of my life. I took steps to phase out the RANN (Research Applied to
National Needs) program; in many respects it was a reasonably pro-
ductive program, but its approach to the support of research was not
appropriate for NSF and did not live up to our standards. I closed sev­
eral regional offices, including one in San Francisco. I ordered a reduc­
tion in force—a RIF—a very unusual action in the federal government.
These actions raised some hackles in Congress and OMB, but in my
view I was cleaning house for the next director.

By the time Jimmy Carter was elected in 1976, I had the strong
support of the National Science Board, whose membership included
Frank Press, soon to be named the president's science advisor. The next
thing I knew I was nominated to be director of NSF. It was a move I
had neither intended nor expected. Nor did I, with my social sciences
background, quite fit the mold of an NSF director. Not long after my
appointment, on a visit to Columbia University, I saw Dr. I. I. Rabi, an
influential physicist during and after the Second World War. He told
me he had heard only the best things about me, and was so pleased I
was going to be the director of NSF—and by the way, what field of
physics was I in?

Perhaps my most important contribution as director was to
recruit George Pimentel, from this campus, as deputy director. George
was a world-renowned chemist, whose death a few years ago was a
great loss to science and to UC Berkeley. George and I worked well as
a team and accomplished a great deal. Together we brought the business
and administrative practices of NSF into the modern age. We expanded
the behavioral and social sciences. We elevated engineering to the level
of a full directorate. This pleased the engineering community, many of
whose members were trying to get the Foundation's name changed to
"National Science and Engineering Foundation." We also established a
research program in economics, focused on the role of R&D in stimu­
lating economic growth; that field of research has prospered over the
past twenty years, and has led to an important development in econom­
ics known as "new growth theory."

It was also clear to us in the late 1970s that, while the nation's
research universities were amazingly fruitful in producing new ideas,
the process of transforming those ideas into applications—technology
transfer—was not working as well as it should. We responded in several
ways. NSF initiated the Industry-University Cooperative Research
Program, a venture that was controversial in the 1970s but today is
standard practice. In addition, we assembled a working group to
address the federal policy that patents generated from government­
supported research at universities should reside with the government.
We conducted a series of policy studies that laid the groundwork for
the passage in 1980 of the Bayh-Dole Act, which transferred patent rights to universities.

Those were the years when China, with the end of the Cultural Revolution, was beginning to open to the West. During my tenure as NSF director, I negotiated and signed the first memorandum of understanding in history between the People’s Republic of China and the United States, an agreement for the exchange of scientists and scholars. Finally, I claim sole credit for establishing the Vannevar Bush Medal, awarded annually by the NSB to an individual who has made major contributions to the well-being of the science enterprise. As may be obvious, Bush stands tall in my eyes.

During my years as director, NSF received no Golden Fleece awards; Senator Proxmire, indeed, became a good friend to the Foundation. In my last few weeks at NSF, Proxmire spoke at a seminar on biological methods of pest control. At the seminar he freely admitted that the study of the sex life of the screw-worm fly had been of major significance to progress in this important field.

I left NSF in July of 1980. Ronald Reagan was elected the following fall. He appointed as director of the budget David Stockman, whose first budget eliminated from NSF all science education activities (except graduate fellowships) and all of the social sciences. By the time the budget made its way through Congress, some of the social science activities had been reinstated, but at greatly reduced levels. A few years later, in an article in the New York Times, Stockman stated that he had made a mistake in eliminating these programs. On the other hand, he said, it was the kind of mistake he didn’t mind making. But as the 1980s unfolded there was a renewed focus on science education throughout the country, and gradually NSF reintroduced and added programs in that area.

Congress always liked science education. One of NSF’s problems was that most of the research it funded went to a relatively small group of universities; their concentration in a few large states complicated NSF’s ability to gain broad support in Congress. In science education, on the other hand, funds went to virtually all of the states. While I was director, we started a program to work with universities in states that received few NSF grants, giving them advice and assistance so that they could be more competitive in seeking grants. It was called Experimental Program to Stimulate Competitive Research, or EPSCoR, and is still in existence today. That is an interesting story all by itself, one that needs to be examined.

By 1992 the science education directorate was reestablished and the social sciences were viable if not prospering, but clearly the re-
emergence of these two areas was influenced by earlier events. Some people argue that the Foundation—shaped by these events—has been too cautious in its approach to science education and the social sciences.

Conlan lost the 1978 election. Bauman prospered throughout the 1970s—he was a leader on the floor of Congress and an important figure in the conservative movement. Everyone thought he would run for the Senate in 1982. Then the world came apart for him—he was arrested for sexually molesting a young boy. This story is told, with admirable candor, in his book *The Gentleman from Maryland: The Conscience of a Gay Conservative*. Once he had been arrested, his career was finished. He had been NSF’s most severe, persistent, and unrelenting critic, charging that our efforts in science education served only to undermine the moral character of American children. Reading his book, I felt a certain sadness about what happened to him. But when I recall him across the witness table, my sadness is easier to bear.

The purpose of these remarks has been to give you a sense of the evolution of federal policy on science and science education in the postwar era, through the lens of my personal experience at NSF. The science enterprise during the postwar period needs to be interpreted from a variety of perspectives. Perhaps my experience will prove useful. Let me end as I began, with the hope that, if nothing else, these remarks may stimulate some young historians to take a fresh look at this fascinating era in the annals of American science.
Richard C. Atkinson: President-Elect of AAAS

WILLIAM J. MCGILL

When Washington veterans describe managerial effectiveness as practiced in their town, they use abstractions such as agencies, staffs, and access to the White House. They dwell on adversary contentions: turf fights, budget struggles, and legislative coups. What emerges is the style of an experienced political operator overcoming opposition by any means necessary.

The successful manager is usually far less combative. Anyone who has received a late-night urgent phone call from Dick Atkinson during his tenure as director of the National Science Foundation (NSF) or as chancellor of the University of California, San Diego (UCSD), will attest to his powers of persuasion and his unremitting assaults against problems until they are resolved. But the essence of Atkinson's managerial style is a restless flood of energy. He simply does not rest until he has constructed paths to all of his goals.

On 12 August 1976, about a year after arriving in Washington, D.C., on an 18-month leave from Stanford University, Atkinson was named acting director of NSF after H. Guyford Stever's move to the White House as science advisor. At that time, the foundation's peer review system was under attack in Congress. Intense pressures were being generated on Capitol Hill to mount research efforts directed at national needs with prospects for short-term payoffs. The funding picture for NSF was bleak as the nation struggled with runaway inflation and with an oil embargo by the Organization of Petroleum Exporting Countries.

Single-minded and determined, Atkinson managed to turn the situation around. Peer review was successfully defended against congressional pressure to allocate science support on a geographic basis. Funding for basic research increased by 11% in Jimmy Carter's first budget, a reversal of declining fortunes in the Nixon-Ford years. Total NSF support grew by nearly 30% between 1976 and 1980, the year Atkinson resigned to become chancellor of UCSD.

Atkinson's principled and competent leadership of NSF earned him the admiration of congressional critics. Senator William Proxmire (D-WI), who made four Golden Fleece Awards to NSF during Atkinson's tenure as director, remarked at Atkinson's last appearance before the appropriations subcommittee, "You have won the confidence of Congress and of this skeptical senator, and you are going to be sorely missed."

Richard C. Atkinson was born on 19 March 1929, in Oak Park, Illinois. At the end of his sophomore year in high school, he was admitted to the University of Chicago, graduating in 1948 with a Ph.B. degree when he was 19 years old. As an undergraduate, Atkinson was attracted to mathematics and biology, a consequence of after-hours computational work with the biophysics research group led by Nicolas Rashevsky. Atkinson decided to pursue graduate work in biology at the University of Chicago and registered for courses, but in 1950 an unusual opportunity opened up in the Psychology Department at Indiana University.

William K. Estes and Cletus J. Burke at Indiana had developed a mathematical theory of learning formulated in the language of set theory. They were searching for graduate students with mathematical skills to help extend their ideas. Atkinson enrolled at Indiana as a graduate student in the fall of 1950 and studied mathematics and psychology. He completed the course work for a Ph.D. in both fields, submitted a dissertation to the Psychology Department, and was awarded the doctoral degree in 1955.

In 1954, Atkinson enlisted in the U.S. Army. He finished his tour of duty in 1956 and soon after accepted a post as lecturer in applied mathematics and statistics at Stanford University. Despite his degree in experimental psychology, Atkinson was still undecided on possible careers in applied mathematics, psychology, or biology. While at Stanford he met Patrick Suppes, a young logician with strong interests in mathematical models. Atkinson and Suppes understood that advances in mathematical learning theory, as well as in the branches of mathematics that supported it, would create an entirely new environment for education in the form of computer-based instruction. It was a time when the impact of computers was just beginning to affect the traditional barriers between the physical and social sciences. Problems were clearly more important than disciplines.

In the fall of 1957 Atkinson accepted an offer of a tenure-track post in the Psychology Department of the University of California, Los Angeles (UCLA). His career direction was now settled. The next 4 years at UCLA were an exhilarating time. Despite a heavy teaching load, Atkinson wrote a book and a dozen published papers during his UCLA tenure and established himself as one of the foremost logicians in the United States.
of the brightest young psychologists in the United States.

Suppes, meanwhile, was determined to bring Atkinson back to Palo Alto. In 1961, Atkinson returned as associate professor of psychology and entered into a close working relationship with Suppes at Stanford's Institute for Mathematical Studies in the Social Sciences. At Stanford, Atkinson attracted brilliant graduate students and continued to publish four to six, sometimes eight, papers each year, many of which were coauthored with his students. He took on major editorial responsibilities and became acknowledged as a national leader in his field.

In 1964 Atkinson was named professor of psychology at Stanford with affiliate appointments in the Schools of Education and of Engineering. In 1968, the Stanford Psychology Department elected him chairman, a post in which he served until 1973. That same year the membership of the American Psychological Association (APA) elected Atkinson to its Board of Directors, and he also became chairman of the Psychonomic Society, the national organization of experimental psychologists. A year later he was named president of APA's Division of Experimental Psychology, and in 1975 chairman of the Psychology Section of AAAS. Atkinson's rapidly growing reputation in science and education was also recognized in 1974 by election to the National Academy of Sciences, the National Academy of Education, and the American Academy of Arts and Sciences.

During the Stanford years, Atkinson's intellectual interests were focused on the study of human memory and cognition. His research ranged from the formulation of mathematical models of memory and tests of these models in carefully controlled experimental situations to the practical problems of developing computer-based systems for teaching reading and mathematics to elementary school children. A paper published in 1968 with R. M. Shiffrin, one of his graduate students, entitled "Human memory: A proposed system, and its control processes," is a statement of Atkinson's outlook at this juncture; it is one of the most widely cited publications in the history of the behavioral sciences (1). The citation for the APA Distinguished Scientific Contributions Award presented to Atkinson in 1977 summarizes the style of his work: "For combining classical methods of mathematics with emerging techniques of computer science, the best traditions of experimental psychology with new concepts of information processing, in the advance of psychological theory and its applications." That award also recognized his "pioneering contributions to computer-assisted instruction and mathematical methods for optimizing the learning process."

Ernest Hilgard of the Stanford Psychology Department, a leading psychologist of the World War II generation and a revered teacher, was the author of a well-known textbook, Introduction to Psychology, first published in the early 1950s. In 1967 Hilgard asked Atkinson to assist him in producing a new version, so Hilgard and Atkinson coauthored the fourth edition. Then in 1971, Rita Atkinson, who earned her Ph.D. at Indiana University in 1957, joined the team of authors. The book is currently in its ninth edition and has been translated into eight languages (2).

In 1975, President Gerald Ford asked Atkinson to become deputy director of NSF. On joining the foundation, Atkinson immediately assumed responsibility for reorganizing the social sciences at NSF and for calming a congressional furor over NSF's controversial science curriculum projects.

In 1977, after his appointment by President Carter as director of NSF, Atkinson confronted powerful pressures aimed at redirecting the foundation's efforts toward applied research on national needs. Atkinson told Congress (3): "For the average citizen, for the average member of Congress, it's a very appealing idea to think of scientists as wasting their time. ... Government and the public have tended to weigh scientific merit based on what they think will be immediately useful. ... But that's not how progress is made. Progress is made by stumbling in dark areas and shining a light on something that perhaps no one could quite conceive of. What's important is to ensure that the scientific community is not driven by the limited views of what science might do as those views evolve in the Washington bureaucracy. There's just too much pressure in Congress to orient science toward the solution of practical problems."

Atkinson became chancellor of UCSD in 1980. The once powerful University of California system had been languishing for nearly two decades. When Atkinson took up his duties at UCSD, he found the campus at about one-third of its originally programmed size, without a capital construction program, and operating in severe budget austerity. During Atkinson's first 2 years as chancellor, he relied on his flair for opportunistic funding and planning. But by 1983 the University of California system had a new president, David Gardner, and the state had a governor, George Deukmejian, who understood the importance of the university for California's economic well-being. The governor's budgets restored higher education to its proper place in the state's priorities. Funds were appropriated and soon began to flow to the campuses, promising a restoration of UC's traditional excellence.

Atkinson's managerial skills were taxed to the utmost by the new-found opportunities to correct long-standing problems, and to build on a scale not seen at UCSD since the post-Sputnik era.

Today, as chancellor of UCSD, Atkinson labors at his accustomed energetic pace. He is no longer the bright, confident, very young man who took psychology by storm in the 1960s. Bold youthful self-assertion has given way to quiet self-assurance. His conversation still sparkles with warmth and friendship, but it is cautious, as befits someone who has survived a long time in the political jungle.

Rita Loyd and Richard Atkinson were married in 1952. Rita has become senior author of the Atkinson, Atkinson, Smith, and Hilgard text. The Atkins had a daughter, Lynn, who is a neurosurgeon at the Henry Ford Hospital in Detroit, Michigan.

REFERENCES

Distinguished Scientific Contribution
Awards for 1977

The Awards for Distinguished Scientific Contribution are presented by the Association at the annual convention. The awardees for this year, along with those for the preceding years since the establishment of the custom, are:

1956
WOLFGANG KOHLER
CARL R. ROGERS
KENNETH W. SPENCE

1960
Harry F. Harlow
CHARLES E. Osgood
S. SMITH STEVENS

1964
Gordon W. Allport
Wendell R. Garner
J. P. Guilford

1968
James E. Beren
Eleanor J. Gibson
Muzaffer Sherif

1972
Edwin E. Ginielli
Dorothy Eameson
and Leo Hurwich
Patrick Suppes

1957
CARL J. HovLAND
CURT P. RICHTER
EDWARD C. TOLMAN

1961
JAMES J. Gibson
DONALD O. Hebb
HENRY A. Murray

1965
FLOYD ALLPORT
FRITZ HEIDER
PAUL THOMAS Young

1969
Jean Piaget
Stanley Schachter
Herbert A. Simon

1973
Lee J. Cronbach
Brenda Milner
Benton J. Underwood

1976
Beatrice C. Lacey
and John L. Lacey
Theodore M. Newcomb
RogNER N. Shepard

1958
FRANK A. Beach
PAUL E. MeehEL
B. F. Skinner

1962
JEROME S. Bruner
William K. Estes
Harry Helson

1966
Nancy Bayley
Clarence H. Graham
Richard L. Solomon

1970
Donald T. Campbell
David Krech
R. Duncan Luce

1974
Angus Campbell
Lorrin A. Riggs
Richard F. Thompson

1977
Richard C. Atkinson
Russell L. De VALois
Edward E. Jones

Atkinson, De Valois, and Jones were each presented with a check for $1,000 and an engrossed citation of his formal contributions to the development of scientific psychology. These psychologists have agreed, in accordance with established custom, to present addresses on some phase of their scientific work at the 1978 Convention. The presentation of awards was made by Richard F. Thompson, former Chair of the Committee on Scientific Awards. Other members of the Committee are Gerald C. Davison, John I. Lacey, Walter Mischel, Lorrin A. Riggs, and Elaine C. Walster.

Richard Chatham Atkinson

Citation
"For combining classical methods of mathematics with emerging techniques of computer science, the best traditions of experimental psychology with new concepts of information processing, in the advancement of psychological theory and its applications. His long-term collaboration with Patrick Suppes yielded among its fruits the first extensive application of learning theory to multiperson interactions. With Richard M. Shiffrin, Atkinson developed the model that has set the pace for research on human short-term memory; with James Juola and others he developed an almost equally influential family of models for recognition and search processes. And on a quite different tack, Atkinson anticipated current demands for 'relevance' with his pioneering contributions to computer-assisted instruction and optimization of learning."

Biography
Richard C. Atkinson was born in Oak Park, Illinois, on March 19, 1929, and attended grade school and the first two years of high school in that township. Instead of completing high school, he entered the University of Chicago in the fall of 1944, earned the PhD degree in 1948, and then stayed on for an additional year of course work. After a brief period of study at the University of Louisville, he enrolled at Indiana University where he received the PhD degree in 1955. While at Indiana University, he worked closely with William K. Estes,
Richard C. Atkinson

Cletus J. Burke, and James Egan. The working relationship with Estes was particularly important in shaping his interests in psychology; they have published several papers together, and few of Atkinson’s research projects have been undertaken without prior consultation with Estes.

In 1952, Atkinson married Rita Loyd, also a graduate student in psychology at Indiana University, who completed her PhD degree in 1957. They have one daughter, Lynn, who is currently in medical school at Brown University.

From 1954 to 1956, Atkinson served in the U.S. Army and was assigned to the Human Resources Research Unit at Fort Ord, California. His first academic position was at Stanford University in the fall of 1956 as lecturer in the Department of Applied Mathematics and Statistics. It was at this time that he met Patrick Suppes, with whom he has maintained a long and close relationship on both scientific and personal matters.

At the time he went to Stanford University, Atkinson planned a career in applied mathematics and statistics. However, six months after arriving at Stanford he received an offer from UCLA to be an assistant professor of psychology. Academic positions were scarce, and the opportunity for an appointment with a clear track to tenure was extremely appealing—thus the decision to change career objectives from an emphasis on mathematical work to a primary commitment as an experimental psychologist.

Atkinson found life at UCLA exciting and rewarding. His research went well, and he was the first exposure to academic politics was intriguing, if not a total waste of time and energy. He remembers that period as one with virtually complete freedom to do research and explore new ideas. Edward Carterette of the UCLA faculty was a particularly good sounding board for research proposals and proved to be a close personal friend. Atkinson’s research at UCLA focused primarily on psychophysical problems concerned with signal detection and signal recognition, and on problems of learning—particularly models for stimulus discrimination learning.

Teaching requirements at UCLA seemed minimal at the time but, by today’s standards, were quite rigorous. Every semester, he taught two sections of introductory psychology plus one other course—statistics in the fall semester and a graduate course in mathematical psychology in the spring. Each section of introductory psychology had over 300 students, so in a given year he had contact with some 1,200–1,300 students. Although this was a large number of student contact hours, it seemed like an easy teaching load since it involved only three preparations per week.

In 1961, Stanford University made Atkinson an offer to be an associate professor in both the Psychology Department and the School of Education. The offer also involved an appointment in the Institute for Mathematical Studies in the Social Sciences and an affiliated faculty membership in the School of Engineering’s Department of Engineering and Economic Systems. Gordon Bower had been appointed to the Stanford faculty the previous year, and William K. Estes was to be appointed the following year. These and other appointments, combined with Patrick Suppes’ presence at Stanford, made the university an exciting place for work in psychology.

In the early 1960s, much of Atkinson’s research was on mathematical models for learning and perception, and it was during this time that he became interested in the classroom instruction of young children. This interest led to his development of systems for computer-assisted instruction, one of
which was a program in reading for children in the primary grades.

By the mid-1960s, Atkinson's interest had turned to the area of memory and cognition—particularly theories of human memory and their control processes. This work, in conjunction with his applied interests in computer-assisted instruction, led to a concern for optimizing the learning process—both in a practical sense and in the development of mathematical models for optimization. These optimization models proved to be particularly effective when implemented as part of a program of computer-assisted instruction.

It is important to note that most of Atkinson's research has been published in collaboration with graduate students. Stanford University attracted unusually talented and dedicated students. These students contributed greatly to the intellectual environment at Stanford and helped create a near optimal situation in which to do research.

In 1967, Atkinson joined Ernest R. Hilgard as a coauthor on the fourth edition of *Introduction to Psychology*; and in 1971, his wife, Rita, joined the team on the fifth edition. This collaborative enterprise has been exciting and productive. It has deepened his interest in all aspects of psychology and has provided a framework within which to organize his thinking about the field as a whole, its relationship to other sciences, and its potential contributions to society.

On May 9, 1975, Richard C. Atkinson was appointed by President Ford as the Deputy Director of the National Science Foundation. On May 3, 1977, he was appointed by President Carter as the Director of the Foundation. He is on leave from Stanford University and plans to return to the university after completing his assignment at the National Science Foundation.

Honors awarded to Atkinson during his professional career include the following: Distinguished Research Award, Social Sciences Research Council, 1962; Fellow, Center for Advanced Study in the Behavioral Sciences, 1963–1964; Society of Experimental Psychologists, elected 1967; Guggenheim fellowship, 1967–1968; Distinguished Visiting Scholar, Educational Testing Service, 1971; Chairman, Psychonomic Society, 1973; President, Division of Experimental Psychology, American Psychological Association, 1974; National Academy of Education, elected 1974; American Academy of Arts and Sciences, elected 1974; National Academy of Sciences, elected 1974; Chairman, Psychology Section, American Association for the Advancement of Science, 1975; President, Western Psychological Association, 1975–1976; Professional Achievement Award, University of Chicago Alumni Association, 1976; DSc (honorary), Bucknell University, 1977.

PROFESSIONAL AND SCIENTIFIC PUBLICATIONS

1952

1956

1957

1958

1959

1960

1961

1962


1963


1964


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