Richard Atkinson
Robert Dynes
V. Wayne Kennedy

Interview conducted by

Gary Robbins, Reporter – San Diego Union-Tribune

SAN DIEGO TECHNOLOGY ARCHIVE

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Richard Atkinson

Richard C. Atkinson is president emeritus of the University of California and professor emeritus of cognitive science and psychology at the University of California, San Diego. He served as president of the UC system from 1995 to 2003; his tenure was marked by innovative approaches to admissions and outreach, research initiatives to accelerate the University's contributions to the state's economy, and a challenge to the country's most widely used admissions examination—the SAT—that paved the way to major changes in the way millions of America's youth now are tested for college admissions. Before becoming president he served for fifteen years as chancellor of UC San Diego, where he led that campus's emergence as one of the leading research universities in the nation. He is a former director of the National Science Foundation, past president of the American Association for the Advancement of Science, and was a long-term member of the faculty at Stanford University. His research has been concerned with problems of memory and cognition. He is a member of the National Academy of Sciences, the National Academy of Medicine, the National Academy of Education, and the American Philosophical Society. He is the recipient of many honorary degrees, the Vannevar Bush Medal of the National Science Board, and a mountain in Antarctica has been named in his honor.

Source: http://www.rca.ucsd.edu/biography.asp

Robert Dynes

Robert C. Dynes was the 18th president of the University of California, from 2003 to 2008. A first-generation college graduate and a distinguished physicist, Dynes served as the sixth chancellor of the UC's San Diego campus from 1996 to 2003. He came to UC San Diego in 1990 after a 22-year career at AT&T Bell Laboratories, where he served as department head of semiconductor and material physics research and director of chemical physics research. His numerous scientific honors include the 1990 Fritz London Award in Low Temperature Physics and his election to the National Academy of Sciences in 1989 and the American Academy of Arts and Sciences in 1994.

While president, Dynes also was a professor of physics at UC Berkeley, where he directs a laboratory that focuses on superconductivity and incorporates postdoctoral and graduate students, as well as undergraduates, in physics and materials science. As a professor of physics at UC San Diego, he founded an interdisciplinary laboratory where chemists, electrical engineers, and private industry researchers investigated the properties of metals, semiconductors and superconductors. He subsequently became chairman of the Department of Physics and then senior vice chancellor for Academic Affairs.

Since leaving the UC presidency in June 2008, Dynes has joined the boards of Argonne National Laboratory, the review panel for the Canadian Foundation for Innovation, the Helmholtz Foundation in Germany and the San Diego Foundation. He currently chairs a National Academy of Sciences Study on Advanced Radiation Detectors; its report is due to the Department of Homeland Security in March 2009. He has rejoined as a professor the UC San Diego Department of Physics.

Active in the national scientific arena, he is a fellow of the American Physical Society, the Canadian Institute for Advanced Research and the American Academy of Arts and Sciences. He has served on the Executive Committee of the U.S. Council on Competitiveness, the California Commission for Jobs and Economic Growth and the Governor's Nurse Education Initiative Task Force. He is a Fellow of the California Council on Science and Technology and a member of the Business-Higher Education Forum.

A native of London, Ontario, Canada, and a naturalized United States citizen, Dynes holds a bachelor's degree in mathematics and physics and an honorary doctor of laws degree from the University of Western Ontario and master's and doctoral degrees in physics and an honorary doctor of science degree from McMaster University. He also holds an honorary doctorate from L'Université de Montréal. He is married to Ann Parode Dynes, the former campus counsel of UC San Diego.

Source: http://rdynes.ucsd.edu/biography.html

V. Wayne Kennedy

V. Wayne Kennedy joined the University of California's Office of the President as Senior Vice President for Business and Finance on June 1, 1993 and served in that capacity until retiring September 1, 2000.

As one of two senior vice presidents who reported to UC President Richard C. Atkinson, Mr. Kennedy had a broad range of duties and responsibilities. These include development of policy for and supervision of the university's financial systems, business functions, audit and corporate accounting, information systems and computing, technology transfer, facilities administration, employee and labor relations, benefit and retirement programs, hospital accounting, and risk management.

In addition, Mr. Kennedy acted for the president in the absence of both the president and the provost and senior vice president for academic affairs.

A nationally recognized expert in issues related to the financing of research universities and medical education, Mr. Kennedy previously was vice chancellor for administration at UC San Diego for eight years. He was in charge of campus administrative functions as well as development and management of the annual operating and capital budgets. UCSD, one of five UC campuses with medical schools and teaching hospitals, has a current enrollment of more than 36,000 undergraduate and graduate students.

Mr. Kennedy's career in university administration spanned more than 40 years, beginning at the University of Maryland where he was a faculty research assistant in the Department of Physics and Astronomy. He later was assistant comptroller responsible for research administration and then assistant dean for administration at the University of Maryland School of Medicine.

Mr. Kennedy joined UC San Diego in 1973 as assistant vice chancellor for health sciences and associate dean for administration of the School of Medicine. His other campus administrative positions included director for planning and budget and vice chancellor for resource management.

Mr. Kennedy's professional activities included past and present membership on numerous boards and committees dealing with technology transfer, governmental relations, grant and contract policies, private fund raising, and medical education administration. He is also the author and co-author of numerous papers and statements delivered before governmental bodies and agencies and professional and academic organizations. In March 1993 he was awarded a Fulbright Fellowship which he declined in order to accept appointment as Sr. Vice President.

Mr. Kennedy continues to hold a part-time, non-salaried appointment at the University of California as a senior advisor. He serves on the boards of several not for profit and for profit entities including the University of California Press, the Rees-Stealy Research Foundation and the Scripps Institution of Oceanography Advisory Board. Past board service included First Dental Health of California, Inc, the San Diego City Employees Retirement System and the Los Alamos National laboratory Foundation.

A graduate of the University of Maryland, Mr. Kennedy received a Bachelor of Science degree in industrial management in 1961. He did graduate work at the University of Maryland's College of Education.

THE SAN DIEGO TECHNOLOGY ARCHIVE

INTERVIEWEES: **Richard Atkinson**
Robert Dynes
V. Wayne Kennedy

INTERVIEWER: **Gary Robbins, Reporter – San Diego Union-Tribune**

DATE: **November 13, 2017**

Robbins: Hi, everybody. It's November 13, 2017. We're at Mandeville Special Collections at UC San Diego. I'm talking to Wayne Kennedy and Bob Dynes and Dick Atkinson. Thank you guys so much for making time.

We wanted to go back this morning and talk about how biotech and life sciences evolved in San Diego County, particularly the role the university played in helping with these companies and nurturing them and what you did with industry to bring it into the kind of industry that it is today.

Now, Wayne, you go back to 1973, your involvement with the campus. You [Atkinson] became chancellor in 1980, and you [Dynes] in 1995. But I want to start with something that I saw when I was a college student in 1974. I was in Boston and I was walking down the street and I saw a headline in the *Boston Globe,* a big headline saying that Monsanto was going to give a ton of money to Harvard cancer researcher, Judah Folkman. And there was a column with it saying was this the right thing to do; academia shouldn't be working with industry. Wasn't there at time where that wasn't something people wanted academia to do? Didn't it used to be a lot different?

Atkinson: Well, it was a late time and an early time. When I was president I wrote to the regents—that's a document on the regents' public agenda. *The Atlantic* magazine had done a very critical story of a number of universities that had elaborate connections with industry. This letter described our connection and the fact that we were proud of it, that it only accounted for 9-percent of the university's research funding, but the industry-university connection was a very important one

for training students, for transferring research into the private sector, and also for helping fund university activities.

Robbins: When would that have been, Dick?

Atkinson: That was probably 1997. But these issues go back. When I was at NSF we established the Industry-University Cooperative Research Program, that was unheard of, and there was real criticism, should the industry be working with universities. That program was one where NSF funded the university side of the project, industry funded its side, and it was a joint project. Once NSF started to get joint proposals, they were spectacular.

Dynes: There was a period, though, that I think—I was not in university at the time; I was at Bell Laboratories. But people have moved back and forth between Bell Laboratories and universities all the time. But there was a sense that too close a relationship would somehow corrupt the universities. There was something—from where I sat. A sense that people would be more concerned with revenue-generating processes than seeking truth.

Atkinson: Job shops.

Dynes: Job shops is a crude way to put it.

Atkinson: Yeah. Some universities operated in a sense as job shops.

Kennedy: But even within the university there was lots of suspicion, particularly on the part of the social sciences and humanity faculty. You were very much against the university becoming too close to business.

Dynes: Oh, absolutely. They believe we would be corrupted. They believed that people would be doing things for money.

Kennedy: There was an underlying current here when I came here in the early '70s of suspicion about that kind of an approach, even though there was very little of it at that time.

Atkinson: Let me make a very blunt comment. Before World War II there was virtually no federal money coming to universities for research.

Dynes: Right.

Kennedy: Correct.

Atkinson: You can find a few counterexamples, but that was the policy of the United States Government. And when Vannevar Bush came along with *Science: The Endless Frontier* with the idea that it's the responsibility of the federal government to fund basic research in universities, a lot of universities said, "We shouldn't be taking money from the government because that would be corrupting." Northwestern, for example, for a good ten years, refused to take federal research money, until they realized they'd be out of the game if they didn't.

Dynes: Right. The irony is look at Northwestern now.

Robbins: Well, Wayne, what was the attitude among faculty here in '73-'74? Because there were a lot of other things going on; we're coming towards the end of the Vietnam War, there was tension within this community about campus and the war. Well, there was a lot of things going on, so faculty versus—

Kennedy: Well, my recollection is the focus when I came here, and I was in the medical school, I mean we were just beginning a growth spurt in the medical school and on the campus. And I think the focus was on recruiting new faculty, getting these new programs underway, expanding the medical school. When I came there were 65 students in a class, took it up to 120. And being competitive for federal contracts and grants, which the faculty obviously were very interested in, because that's how they got their promotions and tenure, through their research and publications and what-have-you.

But there was more focus on the federal side on growing the university than there was on any real involvement with industry. In those days there was virtually no biomedical industry here; there was the defense industry from World War II, Korea, and the Vietnam War, but very little on the drug biomedical side of things.

Atkinson: Well, Salk was here.

Kennedy: Salk, yeah. But that's a not-for-profit, just like we were.

Atkinson: Right.

Kennedy: It was even tinier then than it is now in terms of its total financial structure.

Atkinson: Well, that's true.

Kennedy: It was very isolated, quite frankly. Faculty-to-faculty there were a lot of good relationships with Salk in the '70s. Institution-to-institution they didn't exist.

Robbins: Bob, you were at Bell Laboratories. What did industry think about getting deeper with universities? Was there any anxiety there or was it—

Dynes: Oh, not for people at Bell Laboratories. Bell Laboratories looked upon universities as a great source of people. I mean that's where we recruited. We had a very sophisticated recruiting system, where each and almost every member of the technical staff, which is what the scientists were, had a responsibility to spend time in a particular university. I spent time in the University of Chicago, Canadian universities, and Harvard. What you would do is go to these schools and walk the halls, talk to the faculty, listen to who was coming; not who was ready for a job, but who was coming, and then keep in touch with them for two or three years so that by the time—*[Laughs]* You knew this, Dick?

Atkinson: Yeah.

Dynes: Okay. So by the time they were graduating they had a familiarity with Bell Laboratories and what they were capable of accomplishing at Bell Laboratories, such that it was often the right avenue for people to go.

So we really thought about the universities, one, as a source of really outstanding people; and secondly, as a place where people could, after spending five years at Bell Laboratories, go. And so there was a very close relationship, but there was not a really strong partnership in intellectual property at the time.

Robbins: I'm wondering how much Irwin Jacobs influenced things. He was on faculty here from 1966 to 1972, clearly a very entrepreneurial person. How do you characterize his influence in helping this change within the county?

Atkinson: Change? What kind of change?

Robbins: Well, he went on to found companies. Those companies drew from the university real hard over time. It seems like people like him and Ivor Royston were real sparkplugs. But I thought this would be a good time to reflect on what Dr. Jacobs' role was in influencing things.

Atkinson: Well obviously Irwin attracted outstanding faculty. And I might comment that Roger Revelle had a deal with the president of the university at that time. Roger thought that they could bring in so much federal money they didn't need much university money. That's why he got the leeway to recruit at the high level, namely Nobel laureates, senior people, and it was the view that the federal money would flow. Irwin, obviously his coming, along with a number of other

superstars, like Urey set the stage. Suddenly the world at large knew that this was a very special place.

Dynes: But let me add to that. Again, I was still a graduate student and I had heard this legend that there was this new campus being formed in La Jolla. I had to go to a map and look and see where La Jolla was, actually. This was 1967 or so. Then I went to Bell Labs in 1968 and had heard the legendary story of several people that left Bell Laboratories and went to UCSD. Those several people were really outstanding people. So there was serious recruiting went on. Keith Brueckner did a lot of that recruiting of people like Harry Suhl and Bernd Matthias and—there were a whole lot of them that mostly went to physics and some to chemistry from Bell Labs. And it was this legend that was just beginning.

Atkinson: Bell Labs and IBM were unique in those days.

Dynes: They were.

Atkinson: In a sense, the demise of Bell Labs, IBMs and other corporate research centers occurred as the universities were playing an ever-bigger role in research.

Dynes: Yeah, they had to take on—my view is that the one leg of this stool, which was industrial research, General Electric who really started it, and IBM and Phillips and RCA and Exxon and Bell Laboratories and Xerox and Kodak and Ford and General Motors, they all had research labs, and they were all competing in the world that I functioned in, and they're all gone.

Atkinson: In World War II where was the research done? And World War I, for the research, it was done in industry and in federal laboratories, with a few academics advisers. But by World War II you had the industrial laboratories going, you had the military laboratories going, but you had the universities creating their own research laboratories. Federal funding for Los Alamos, that's the University of California. MIT, high-frequency radar, that's the—

Dynes: Lincoln Labs.

Atkinson: There were about 35 universities that played a key role in the war effort and they were—the key role was research that really made a difference in terms of the war effort.

Robbins: Including Scripps Oceanography.

Atkinson: Scripps Oceanography—

Dynes: Well, that was before UCSD, of course.

Atkinson: In San Diego during World War II we had about 800 people employed in what was called the University of California's Defense Laboratories out on Point Loma for SONAR, the work predicting wave actions. People like Munk right here at Scripps Institution. It was a transformation in the way the United States did science.

Robbins: Was it surprising that they could get people of such quality to come in large numbers to La Jolla at a time where most people had to look La Jolla up on a map?

Dynes: Well, wait a minute.

Kennedy: All you had to do was come and visit. *[Laughs]*

Dynes: It was what I call a nucleation; if one person comes it doesn't cause a nucleation. Bubbles, nucleate, and nucleate because a whole lot of spontaneous nucleation occurs. Droplets. And it was a nucleation; it was a point where several people went, "Oh, they're going." There were a lot of people in my view—now Dick might disagree with this, it would be interesting to see—in my view there were a lot of people who were less than happy and comfortable where they were.

Atkinson: You put it well. Bill McGill, the third UCSD chancellor, would say, "Well, we were able to recruit outstanding people," but there was an aspect to it. You know, to get someone who's really outstanding to come, it's partially the draw of the institution, but they're not always happy where they are.

Dynes: Correct.

Atkinson: Then he'd say—of course, the people who weren't happy there tend not to be happy wherever they are. They were feisty group. *[Laughs]*

Dynes: Yeah, but that was a draw. I don't think people move unless there's a push and a pull, and I think the push was often they were unhappy where they were, they were a little bit misfit, they wanted to do things that the traditional universities didn't allow them to or got in the way. And then the pull was of course La Jolla.

Atkinson: The Meyers coming here; she's a physicist, he's a chemical—physical—what's the term?

Dynes: Physical chemist.

Atkinson: Physical chemist. He had a position, a faculty position at the University of Chicago; she only had a research associate position. A woman couldn't

hold a regular position. Well, they recruited them both to UCSD with senior professorships, and about four years later she won the Nobel Prize in physics. The second woman in history to win, a Nobel Prize in any field. The first was Marie Curie.

Robbins: Wait. A woman couldn't do what?

Atkinson: There were few women on faculty before World War II.

Dynes: Especially the University of Chicago. *[Laughter]* I mean Chicago would not allow—

Atkinson: Many universities didn't. Now what's the term?

Dynes: Yeah, yeah, husband and wife. They wouldn't allow that to happen.

Kennedy: It's nepotism.

Dynes: Nepotism, that's it. So Marie was just a lecturer [at Chicago].

Robbins: I could see where some people who might not be happy at one institution would want to go to another. But was it surprising that they would come here? Because it was so new, it wasn't big, things were just beginning to come together.

Kennedy: Great promises.

Dynes: Again, two things. Firstly, you're ignoring the excellence that was going on at SIOs. That was already there. These were great scientists, physicists, as well as oceanographers, et cetera. So they were great scientists who spent time helping to recruit. So it wasn't that UCSD came out of a vacuum. If you look at the early recruits, they were people who know people at SIO, and they were misfits. So it was a combination of misfits—I don't mean misfits; I mean people who weren't happy where they were and just didn't like it. SIO, just a great institution already, with good physicists and chemists, and they recruited them. And then when people started to come, I, as a graduate student, heard about this mystical place which was being formed.

Kennedy: Mystical. I wouldn't—

Dynes: It was mystical.

Robbins: How much of a draw was the fact that there were other institutions here as well, but they were young? The Salk had opened, had had a difficult opening.

It was young. Scripps research was evolving. What became Sanford Burnham was evolving.

Kennedy: Not in those days.

Atkinson: Salk came out to meet with Roger with the idea of having his institute at UCSD.

Robbins: Well, all I'm asking is whether people who were thinking, "Maybe I want to go to La Jolla" were just looking at UC San Diego, or were they seeing that a larger community was beginning to evolve?

Dynes: They were seeing that other people—you look around, you don't live in a vacuum, and you look around and you say, "Well, this person, he's going to UCSD. I wonder why." Then you look at it and all of a sudden you decide to go, and then other people—it becomes a nucleus of a—

Atkinson: The early recruits didn't come to UCSD; they came to what they thought was the Institute for Science and Technology. And that was Roger Revelle's idea, this would be just graduate students.

Kennedy: Public Caltech.

Atkinson: Yeah, a public Caltech, that's right.

Dynes: A public Caltech, just graduate students. That's right.

Robbins: Wayne, did people at UC San Diego in the early '70s have any sense for where this might all go? What it might evolve into?

Atkinson: Are you kidding? *[Laughs]* I'm sorry, Wayne. I just can't— The president of the university at the time was Kerr, and he visits UCSD and wants to explain to the faculty that yes, the original concept was for this special institute, but the needs of the university are such because of future enrollments, we're going to establish a full campus of the University of California in San Diego, and I assure the faculty that you will have the same kind of support that Berkeley had to build a great university here. Well, the faculty said, and this is in Kerr's book, "We're not willing to stoop to that level." *[Laughter]*

Atkinson: That was the attitude.

Dynes: Yeah, that—ixnay on the—

Atkinson: How could we even be in the same—*[Laughs]*

Dynes: ixnay.

Robbins: Well, it's not ixnay; we're talking historically.

Kennedy: I'm not sure I can answer your question, because I don't think I was thinking in those terms in those days. But I did want to make one comment. One of the really interesting features of the medical school when it started was the Bonner plan, in which the basic sciences were actually taught by general campus faculty, who held positions in the medical school and in chemistry or whatever. That was the early integration of the medical school and the campuses, and I think that went a long way in terms of the future of biomedical research at UCSD. Now the Bonner plan is kind of history, I guess now.

Dynes: Well, but it's what built the medical school.

Kennedy: It's what built it. It wasn't always easy, because the faculty members who had those positions in the medical school were viewed by their colleagues with some disdain because they had 11-month appointments as compared to 9-month appointments and their salaries were a little higher than the general campus faculty. So there was a lot of this going on.

Dynes: They didn't teach as much.

Robbins: I'm sorry?

Dynes: And they did not teach as much.

Atkinson: But now another story, the early faculty were chemists, physicists, and mathematicians.

Dynes: Correct.

Atkinson: And they understand how to recruit in their area. But when it came to biology, they didn't know what to do. The senior faculty started to talk to people around the country, "What should we do in biology?" And Bonner's name came up. Why? Because Bonner was preaching the view that the future of biology was molecular and cellular. Medicine, the future of medicine was molecular and cellular. So they recruit Bonner and we start with an emphasis on molecular and cellular. Our undergraduates who were premeds in those days, had to go off campus to get tutoring in botany, zoology, and physiology because what they were being taught was molecular and cellular biology.

Dynes: Molecular. That's true.

Atkinson: Of course the whole world went that way, and we were on the cutting edge. We were hiring some brilliant young people that probably just weren't that attractive to other universities because of their narrow disciplines.

Robbins: This is when genetics was really taking off?

Atkinson: Yes.

Kennedy: Yep.

Dynes: Not everybody either knew or believed in it.

Kennedy: A lot of faculty here didn't believe in it. I remember I spent a whole summer on a committee that Herb Stern chaired, to review the Bonner plan. The general campus faculty just wanted to get rid of it.

Atkinson: Yeah, that's the Bonner plan.

Dynes: And take the FTEs.

Atkinson: These guys were all molecular and cellular.

Kennedy: I understand that. But they wanted the resources.

Dynes: That's right.

Robbins: But did people understand the potential of genomics at that point?

Atkinson: I don't think so.

Kennedy: I don't think so. I'm not a scientist, but I don't think so.

Dynes: You keep referring to people and the faculty, and the point of attracting—

Robbins: No, I'm referring to it as community.

Dynes: So the point of attracting all of these unique characters is that they agreed on virtually nothing.

Atkinson: I mean the traditional university was bogged down in these historic fields. You bring in new faculty, who are they going to be? They're going to be junior people because—

Dynes: Playmates.

Atkinson: Yeah.

Dynes: Playmates for the senior people.

Kennedy: So I mean we were very lucky, I think, with regard—and then that's what's created this wealth of activity, of high talent and people in the biological and medical sciences.

Robbins: Okay.

Dynes: And the relationship. Sorry. Let me chime in, because I'm a physicist. The relationship with the physicists, we were one of the really, really, really early biophysics programs in the United—in the world in fact. In the world.

Robbins: All right. You had people that were really pushing things. So Ivor Royston, oncologist, cancer researcher, he was on faculty here. But he wanted to do more. His idea was that discoveries had to become therapies and drugs and other things more quickly. Tell me about Ivor Royston's influence on the university and what evolved.

Dynes: You must know this better than me, Dick.

Atkinson: UCSD was not unique. Stanford was already on a fast track for moving ideas into the marketplace. There were always faculty who went out and started companies. When I was at Stanford I started a company called Computer Curriculum Corporation with another guy. Royston was certainly one of the early people, but, quite a few faculty around the country were beginning to think in those terms.

Robbins: But I'm referring to what Royston did here. So Hybritech became the first biotech company in the county; it did its work on the PSA test and on hepatitis B virus. So he really pushed it and it became something extraordinary. And Eli Lilly, if I remember right, purchased that company.

Kennedy: That's right.

Robbins: And he and Howard Birndorf continued to do that. Was that like the impetus here? Was he the guy that really got it going, or was he just one of many guys at La Jolla that got it going?

Kennedy: I mean I think it's a combination of things. I think, as Dick said, the world was changing and universities were beginning to get into that spinoff kind of business. My recollection is that in those days the university wasn't a very what I'll

call friendly place in terms of technology transfer and relationships with industry. So it was kind of an evolution; it just didn't suddenly happen. You know, Ivor sold the company, got very wealthy. In fact, I think some of his faculty held him in great disdain because of that, as I recall.

Dynes: Yeah, probably true.

Kennedy: But, it was just part of the evolution that was going on around the country.

Robbins: What was peoples' problem with that? I don't quite understand it.

Kennedy: I think it's just changing tradition. And the focus here was always on federal money, because that was easy to get—not easy, but if you were competitive it was relatively easy to get. And then you had to support your lab, you had to support your technicians, you had to write your papers and your books to get promoted and get tenure and so forth. So the focus was on that. People didn't want to spend time thinking about patenting or disclosures. It was hard to get people to even think about it. We didn't make it easy for them because we didn't have anybody around to help them.

Dynes: There was nobody to help people do that until later.

Atkinson: [Let me inject a few remarks about tech transfer from a personal perspective. Tech transfer has been on my mind for a long time. It started in 1956 when I joined the faculty at Stanford University. One of my valued friends and mentors was Fred Terman who was provost of the university. He played an indispensable role in transforming Stanford into a great research university and along the way invented Silicon Valley. He is commonly known as the "Father of Silicon Valley" and the accolade is richly deserved. A few years ago, Stanford press published a biography titled "Fred Terman at Stanford: Building a Discipline, a University, and Silicon Valley" and I had the privilege of writing the forward to the book.

As a Stanford faculty member, a colleague and I started a company called "Computer Curriculum Corporation" based on our university research. The initial capital was 500 thousand dollars, a personal loan from Mr. Hewlett and Mr. Packard, both former students of Terman. So I had the opportunity to observe Fred Terman up close as he created and molded Silicon Valley. And I had personal experience with a startup company in those early days of Silicon Valley.

In the 1970s, I served as director of the National Science Foundation. By that time,

Germany and Japan had recovered from the devastation of the war years and unexpectedly their companies were giving American companies stiff competition, particularly in technology. American science was flourishing, but scientific discoveries were not being translated into applications. What was the problem? To answer this question, NSF established a special task force on tech transfer. Several policies were identified and enacted by the congress into legislation. But the key to solving the problem was the Bayh-Dole Act of 1980. The Act dealt with intellectual property that arose from federally funded research projects carried out at universities and non-profit institutions. Before Bayh-Dole, intellectual property belonged to the federal government; after Bayh-Dole, it was vested with the institution receiving the federal grant. Bayh-Dole opened the floodgates for universities to commercialize inventions and created the world of tech transfer we know today.

I arrived at UCSD in 1980. It was the perfect time and perfect place to apply some of the lessons learned at Stanford and NSF. The list of UCSD people involved in tech transfer is too long to recall here but I would be remiss if I did not mention the principal leaders: Mary Walshok, Wayne Kennedy, Bob Dynes and Bob Sullivan. Clearly, the establishment of CONNECT was an essential step and its great success was due to Bill Otterson, its first director. He was devoted to the cause, understood the issues, and had a talent for making things work.

Once I became president of the UC System I continued to focus on tech transfer, but now for all ten campuses of the university. Every campus was required to have a tech transfer office and incentives were provided for faculty to license intellectual property when appropriate. Of special note are the Gray Davis Institutes for Science and Innovation that were established in 2002 to couple UC research with the private sector. Over the years, the four institutes have worked with over two thousand companies and have fostered several hundred startups.

Now back to 1980 when I came to UCSD. No one in the academic world took note of the Bayh-Dole Act for quite a few years.] It was probably five or six years before a number of schools began to get the idea. I think that was about when we were setting up the Technology Transfer Office.

Kennedy: We were the first University of California campus that had a technology transfer office.

Robbins: So whose idea was that?

Kennedy: I'll take credit for it. *[Laughs]*

Robbins: Okay.

Kennedy: I'll share it with Dick.

Dynes: And CONNECT was formed about then.

Robbins: CONNECT. I'm going to come back to CONNECT in just a moment.

Dynes: CONNECT was all at the same time.

Kennedy: But before you move on, Dick, the other important thing of the Bayh-Dole Act was it said that the university had a responsibility to get intellectual property into the marketplace.

Atkinson: Yeah, whatever that responsibility really is.

Dynes: But it wasn't the responsibility that drove it; it was the potential—

Kennedy: I understand that. But I'm just saying— we used that with the faculty all the time when we tried to get disclosures, you took the federal money, you have an obligation to disclose.

Dynes: That wasn't the driver.

Kennedy: I understand that.

Robbins: Wayne, how hard was it to get faculty to help?

Dynes: Don't think of the faculty as some monolithic group. There were some faculty who saw the opportunities and away they went.

Robbins: Okay. But he was just saying they were—

Kennedy: In the norm the faculty's priorities were their next grant. Because that's what funded their summer salaries, their labs, their technicians, and got their papers written and so forth.

Dynes: And their graduate students.

Kennedy: And their graduate students. That was the most important thing. You go to a faculty and you go in his lab and you say, "Well, we understand you've got this idea and we should disclose it because it may have some commercial value and it needs to get out in the marketplace" and many of them wouldn't even give you the time of day, because, "Hey, man, I've got to write my next grant proposal."

Atkinson: There were some faculty, like Russ Doolittle, who had great ideas [for application], but were not interested in getting involved in the commercial sector.

Kennedy: Correct.

Atkinson: There was a lawsuit between Richard Lerner, who was at—you know the lawsuit?

Robbins: I know Richard Lerner. *[Inaudible Crosstalk]*

Dynes: This is a key story.

Atkinson: Russ Doolittle and a graduate student were carrying out some important research. He knew Richard Lerner, who had come and visited his laboratory quite regularly, and suddenly Russ learned—a year or so later that Richard had patented some of his ideas.

Kennedy: Right.

Atkinson: So Russ—that's roughly when I arrived at the campus—comes in to see me and says, "I want to sue." So we filed a lawsuit run by the system-wide lawyers before we had our own campus lawyers.

Dynes: OP [University of California, Office of the President}.

Atkinson: —in the president's office. And Russ would come in every so often and say, "What's happening in the lawsuit?" I'd call the lawyer, "Oh, we're working on it. Then finally about three years later Russ was saying, "Come on, what's going on here?" and I called the lawyer again, and he said, "Oh, you know, we settled that." "What do you mean you settled it?" "You know, we settled it." "Well, what do you mean?" "Well, he paid $25,000." I said, "That's not what we wanted in the settlement. We wanted to establish the fact that that the intellectual property belonged to UCSD."

Robbins: I wanted to go back. There's one thing that I don't understand.

Dynes: Only one?

Robbins: I understand everything you're telling me about what the culture of the university was and you had to publish and you had to get your next grant. And not a lot of people—it wasn't common for people to do tech transfers.

Dynes: Correct.

Robbins: But, Jesus, these scientists were part of society, they saw people dying around them. Didn't they want to push their technology out faster so that it would simply help everybody? See, now you're rolling your eyes, Dick, but—

Dynes: No, but let me—

Robbins: You're kind of rolling your eyes with your body language here.

Dynes: So let me try to answer you.

Atkinson: Well, let him answer—yeah.

Dynes: Let me try to answer your question.

Robbins: Okay.

Dynes: If you're driving down the highway and someone pulls in front of you, are you thinking about next month, that car, or are you thinking about how the hell do I avoid that car?

Robbins: No, I'm not.

Dynes: Okay. So if you're running a research laboratory and you have six graduate students, all of which are funded by federal grants, you get a couple months summer salary that are fed by federal grants. Your equipment is paid for by the federal grants.

Robbins: Got it.

Dynes: And you're trying to maintain this, you're trying to feed graduate students, whose lifetime is five to six years on grants that are two to three years long. You've got to have a continuous flow of support from the federal government or your research effort will collapse. And someone comes along and says, "Would you spend some time doing something else?" the answer is, "Which of the eight days a week do you want me to do that?"

Robbins: But was it that difficult to do something else, to do—?

Dynes: Yes.

Kennedy: Yes.

Atkinson: Yes.

Kennedy: But the other thing is if you think about for every 100 disclosures there are there might be 10 patents or 15 patents.

Dynes: One or two of them might generate—

Kennedy: For every 15 patents or for every 1,000 patents there might be one or two that actually generate much money.

Robbins: Okay.

Atkinson: So that might be quite a few years in the future.

Kennedy: Yeah. So the financial incentive just wasn't there. Did they have an obligation? Sure. But Bob just gave you the clue—

Robbins: But what about the humanity aspect? The reality was that some of these same scientists had cancer or had members of their families with cancer.

Dynes: Well, it's all true. What you're saying is true. There were individual faculty who had a long-term mission to solve particular problems for humanity, long-term missions. But when you walk into your laboratory, your office on a Tuesday morning, you have more immediate issues facing you. Yes, over time some of them will drive towards that. That's part of what makes UC San Diego a little bit on the edge, is that there are some more here than there are in most places that do that. But it's not that many.

Robbins: All right, let's roll into 1980. You're named chancellor of UC San Diego. I'm really curious as to what you were thinking about what you had inherited at that point and where you were going to lead it. Because CONNECT came pretty quickly, so you had to be thinking about university industry ties. Tell me about what you were thinking when you—

Atkinson: If I haven't made it clear, that's what I've been thinking about from the Stanford days on.

Robbins: Well I'm trying to just specify to here—

Atkinson: Well, as I said, I started a company while at Stanford. I understood the issues of starting a company outside of university. But if you look at the biography of Fred Terman—does the name Fred Terman strike at all?

Robbins: Mm-hmm.

Atkinson: Fred Terman, Father of Silicon Valley. We did not invent everything here in San Diego. We were inventive, but we were fortunate to be at the forefront of the institutions that were pushing along this line.

Now I'll tell you a story. Jerry Brown was governor at the time. He was very friendly with Lynn Schenk and would come down to San Diego. Lynn invited me over to run with him. So I would run with him on Sunday mornings. That was when I could still run. And I talked the governor into establishing what was called the California Commission on Industrial Innovation. It was a commission that had some interesting people on it. David Packard was on it; Steve Jobs, a young guy was on it; about 20 people. We looked at the whole issue of industry innovation and came out with a report that was published in 1982, just as he was finishing his first eight year term as governor. It's on my website, and it was called "Winning Technologies: A New Industrial Strategy for California and the Nation." We have 50 recommendations for how to get industry innovative, and there are 25 that could be used today.

Robbins: Hmm. What were some of the ideas?

Atkinson: Well, the ideas I was focused on was the role of universities in moving technology into application. Now the guy who was his aide, the governor's aide, was Gray Davis. And Gray Davis would come down here regularly. I introduced him to Irwin Jacobs and a bunch of other people and he got the idea, "God, this is important" and that's what led to the California Institutes of Science and Technology when Gray Davis was governor.

So what's the question? I mean that was always key on my mind.

Dynes: It was on his mind long before he came to UCSD.

Robbins: It was on your mind, but I was trying to understand that once you got here how you plotted out a course to realize what you wanted to do.

Atkinson: It was clear what we had to do, what course to follow.

Robbins: Well, there was a course.

Dynes: Let me interject for Dick. I believe that he set a climate that I was fortunate enough to inherit, and Wayne was involved in it too. When a chancellor sets a climate they can actually affect at some level what people are thinking and how they're thinking. He came with that prejudice, with that drive, and that set a climate.

Robbins: What did the faculty think of the climate that you were trying to set?

Atkinson: You know, one of the things was the extension service. The faculty weren't willing to get very close to the extension service. Mary Walshok was very good in those days at setting up special courses that were important to industry. When a new programming language was introduced we anticipated it and already had an appropriate course in our extension program.

Dynes: That's right.

Atkinson: But, the CONNECT was a factor and the future of having a business school and a pharmacy school was part of the future.

Kennedy: And engineering, the expansion of engineering.

Atkinson: Yeah, oh, engineering. That's a—

Dynes: Engineering didn't exist then.

Kennedy: Didn't exist.

Atkinson: Yeah, when I got here.

Robbins: Now it has 9,000 students.

Dynes: Now it's huge.

Atkinson: In the campus debate about establishing a school of engineering, the faculty were terribly worried about how much resources it would consume. Now a third of our students are in engineering. We have the largest engineering program in the state of California, in fact, the entire West Coast.

Kennedy: The first capital project that we did in over a decade was engineering, building unit one. Remember that?

Atkinson: We had a lot of opposition in the UC wide system. The president's office did not want us to start a school of engineering.

Dynes: Yeah.

Atkinson: They were always—

Robbins: So as you arrived in La Jolla and got to know the industry here, the company leaders, what were they telling you? Were they really hungry to have the university to do more to—?

Atkinson: There's a newspaper clipping someone gave me recently, 1985, a group of 35 industries get together and they each give us I think $2,500. Then we have $100,000 and we establish this program in technology entrepreneurship at UC San Diego. It's an old clipping; you can have a copy of it. But it's kind of interesting.

Robbins: Are you talking about CONNECT?

Atkinson: CONNECT is what came out of that initial program.

Robbins: Okay. So a lot of people made CONNECT happen. You made it happen—

Atkinson: Well, everybody has multiple of founders.

Dynes: Right, there are many authors.

Atkinson: Yeah.

Robbins: Okay. David Hale was named—

Atkinson: In fact, the reason I have that clipping, a guy who is cited there was one of the corporations who gave money. He explained to me—I asked him, this morning I saw him and I asked him about the clipping and he said, "Oh yeah, I talked to Mary Walshok, I told her we have to do this. You guys were just thinking about companies and not technologies."

Robbins: Many authors.

Atkinson: Yeah.

Kennedy: Oh, and remember the Magnetic Recording Research Center?

Dynes: Yeah, CMRI, yeah.

Atkinson: Oh god, yes.

Robbins: So things were changing. You become chancellor. It's a period of time where people are beginning to recognize that they need better connections, like the one that you're talking about here. The Mesa is growing at that point. Salk is starting to mature. Scripps Research Institute is evolving into this wonderful thing that it has become. Sanford Burnham by a different name I guess at the time, was evolving. When you were looking at the landscape you must've been pretty pleased, because it wasn't just you; there was a lot of things to pull together.

Atkinson: I thought a lot about the Salk Institute. When I was chancellor, Salk was in real trouble financially, and there was a question of whether it would survive. I had a deal with the governor, Pete Wilson, that if Salk could not survive we would acquire it. That would've made Roger Revelle happy because it was supposed to be part of the UCSD from the beginning.

Robbins: But the point I'm making, Dick, is that there were institutions that were evolving. Some were struggling, some are still struggling, but they were part of like an ecosystem that was beginning.

Atkinson: Boston had a lot of that. The research triangle in North Carolina, Stanford was booming with these things. It wasn't sort of—we were in the business, but it wasn't unique to UCSD.

Kennedy: Let me make a point here. My recollection, in those days, '70s and all the way through the '80s, there was a lot of faculty-to-faculty interaction, and there were some joint research. But institution-to-institution there was not, in my judgment, a lot of close ties. We were in competition, quite frankly.

Atkinson: Oh, you mean to like Salk and so on.

Kennedy: Yeah, Salk and Scripps Research, we were in competition. But the faculty managed to get along, but institution-to-institution there was not a lot of close—

Dynes: But when I arrived there were joint programs and there were students in those joint programs.

Kennedy: When it was program-to-program, Bob, it was not really at the institutional level

Dynes: Sure. But there were students studied at Salk and UCSD and got their PhDs and it was a collaborative program.

Robbins: So enlighten me. I don't understand why there wasn't more institution-to-institution.

Atkinson: Because it's—because all—*[laughs]* I'll give you a very blunt reason.

Robbins: Please.

Atkinson: These joint programs were interesting, but it was always difficult to get them established. Because the faculty at UCSD would say, "Well, the thing I have going for me is I've got graduate students. These guys don't have graduate students.

Why do I want to give that up? Further, those guys make three times the bucks I make. Why should I now hand them over my best graduate students?"

Dynes: So if it's in your best interest—

Atkinson: Now that would never be said publicly.

Dynes: So get rid of the dismay on your face, because in almost every case individual-to-individual interactions generated ideas, and those ideas then, you come to realize that you can fight over theoretical dollars or you can collaborate or do something that would not be done if it weren't these two researchers doing it together. And so self-interests in terms of accomplish some good science win over the parochialism. Those are examples—and they're example after example after example. Where if you just kind of smooth that avenue for people to generate ideas they start to marry.

Robbins: I understand that. But if you talk to CONNECT and Biocom and they begin to talk about the history of the Mesa, they all talk about how this grew up as this wondrous garden where everybody kind of worked together.

Dynes: That's bullshit. *[Laughter]*

Kennedy: There's some of that.

Dynes: Wondrous garden?

Kennedy: Love they neighbor was not part of the equation.

Robbins: Go back and read their publicity material.

Dynes: Yeah, but history is written by the winners. Right?

Robbins: So I understand that it doesn't have to be institution-to-institution, but when it comes to collaboration from here to there it would—I would think, "Well, it must've been very deep." Because frankly TSRI was better than you guys were in chemistry. Come on.

Kennedy: Say that again.

Robbins: So Scripps Research Institute has been better than UC San Diego in chemistry for a long time. All the rankings show it. It's not the—

Kennedy: They still exist, don't they?

Robbins: Well, they exist—well, they have more than 1,000 people over there.

Dynes: I'm not going to touch that.

Kennedy: Well, the other point—

Atkinson: I don't know what point you're trying to get to—

Robbins: Well, it seems like you guys are being a bit elitist here about, "It was us and we did it and these other places were running out of money."

Dynes: No, we didn't say that.

Kennedy: No, no, no.

Atkinson: It's the last thing—

Dynes: We didn't say that. You're misrepresenting that. We didn't say that.

Robbins: Okay.

Dynes: I said that when individuals seek collective advantage they work together. Didn't I say that?

Robbins: You did say that. But this same university, if you go back and listen to people talk about it, they talk about how this institution evolved into something that was bigger than Research Triangle and different in some way of Silicon Valley, and North Torrey Pines Road is this grand place.

Dynes: Wait. You're translating in your own language something we didn't say. So you can't compare UCSD with Research Triangle. Research Triangle is an entity. UCSD is a university. So you have to compare Torrey Pines Mesa and Sorrento Valley with Research Triangle, not UCSD.

Atkinson: Research Triangle involves three universities—[Duke], North Carolina, North Carolina State. We are better than they are in technology.

Dynes: Absolutely.

Robbins: But because—

Atkinson: I think we're as good as maybe, or not quite as good as Stanford and MIT, but we're damned good.

Dynes: But in individual places we excel, and they keep popping up.

Robbins: But a cluster was evolving on North Torrey Pines Road.

Dynes: Correct.

Robbins: It wasn't just UC San Diego.

Atkinson: No, no. No one's denying that. We benefited from having Salk here certainly, and Salk was a big deal for us. And we benefited from the SRI, obviously.

Robbins: Okay.

Atkinson: I mean we were richer.

Kennedy: People come here whether they work at Salk or TSRI or Burnham. They come here because there's an intellectual base here and interesting people at the university and all these other institutions. So no matter which one you work for, you do have access to all these other people. Over time it sorts of feeds on each other.

Atkinson: But CONNECT was unique to us.

Kennedy: It was.

Dynes: CONNECT was unique.

Atkinson: Nothing else quite like it. Lots of places have tried to start CONNECT programs without similar success.

Kennedy: Bill Otterson I think gets a hell of a lot of credit for pursuing that.

Atkinson: Yeah, our business school or whatever it's called, management school—

Dynes: Rady.

Atkinson: Rady. They claim 150 companies have been produced since they started, which is a hell of a track record.

Dynes: Yes, it is.

Atkinson: You know, but Stanford can claim a lot too.

Kennedy: Right.

Robbins: Dick, could you explain for people who don't know what CONNECT is?

Atkinson: CONNECT is an organization that was initially at UCSD. Sometime while I was president it became a freestanding institution. The idea was not to focus on UCSD, but to focus on science activities in this area and try to link up the scientists and ideas with potential capital, with companies or venture capitalists or the like. It proved to be remarkable and it went out to identify scientists who had developments that had potential, and that encouraged a lot of things.

Kennedy: It provided something we couldn't, and that was the supporting service of the legal, financial—

Dynes: The infrastructure.

Kennedy: —business infrastructure that a young entrepreneur needed. We couldn't do that; we didn't have the talent here to do that, but CONNECT did. A lot of it was volunteers. I mean a lot of it were just people came together and Bill Otterson would cajole all them into providing free services.

Dynes: He just harassed people.

Atkinson: Yeah, and we didn't have the legal support capabilities that they had in the Stanford area, so CONNECT offered a lot of that.

Robbins: Bob, tell me a little bit more. What exactly did Otterson do? I didn't know him.

Dynes: Well, I knew him later. These guys knew him before. But what I saw in Bill Otterson was a guy who was passionate about bringing together an infrastructure of lawyers, of venture capitalists, of people who could write business plans for chemical engineers or electrical engineers who didn't know squat about how to write business plans. Yet he recognized, or some people recognized, or he did, that there was a business opportunity here. He would harass a group of people—I mean he was incessant. He would harass a group of people to look at this in collaboration with the research group, the faculty, to write a business plan to help raise the money, to figure out how to isolate the intellectual property and create a business, which faculty had no idea how to do that.

Most of these people, from where I sat, most of these people did this voluntarily, even when they recognized that this company might be in competition with their own company, but they did it because they believed that the environment needed this flow of new companies all the time, and it was in the best interest of the Mesa, Sorrento Valley and the environs to start these new companies. 'Because most would die, but these companies, occasionally they would seed and grow. I don't know

whether you guys have the same view of him, but he was incessant; he drove people crazy because he was so obsessed by it.

Robbins: So they—him and CONNECT just totally changed the culture here.

Kennedy: Yes.

Dynes: Yeah. They had a—

Atkinson: He played a big role, no question.

Dynes: Yeah. I don't know, totally change is what I choked on.

Robbins: Well, you were describing how people didn't want to do it, and this guy—

Atkinson: Well, it's a little like the seeding issue that you mentioned earlier, once a few faculty saw this—

Dynes: They said, "Oh, I want to do that."

Atkinson: —they started more and more began to think about it.

Kennedy: Right. Right.

Robbins: Did that pick up speed pretty fast?

Kennedy: But then in the meantime, we did begin to develop some infrastructure that helped them, our Technology Transfer Office, which before nothing existed; you had to go to the president's office to get any kind of support.

Dynes: And that never worked.

Kennedy: And we got permission to hire a full-time technology transfer person down here, and I recruited Marty Rachmeler from Northwestern.

Atkinson: That's right.

Dynes: Then Alan Powell followed him.

Kennedy: Yeah. And he would go out and talk to the faculty and help them write their disclosures, help them through the patenting process. Then work with CONNECT. So everything was kind of evolving at the same time. CONNECT was within the university, as Dick said, at the time, part of Extension. So there was a lot of closeness there. Bill and I used to give seminars to explain to faculty the difference between CONNECT and what we did in the technology transfer arena, so the faculty

would have a clear idea about how to go about working with us and then working with CONNECT.

Robbins: I'm going to segue to your chancellorship in just a second, but I wanted to ask—

[Inaudible Crosstalk]

Robbins: —whether there were other things in addition to CONNECT that helped change this culture and helped create these companies or the atmosphere where they could exist. So while you were—during those 15 years that you were a chancellor, what other things were done that helped the process? *[Laughter]* You guys laugh at every question.

Dynes: Well, I laugh because it's vast.

Atkinson: Dan Peg, head of the San Diego Development Corporation, I spent a lot of time talking with him.

Kennedy: Name I haven't heard for a long time.

Atkinson: —it's creating an environment and—

Dynes: It's creating the climate.

Atkinson: You know, when I became president of the university, the first thing, within a year I called a systemwide conference for technology transfer. It's been something that wherever I turn I've been thinking about. [Phone rings.]

Robbins: I turned this off. I apologize. Go ahead.

Atkinson: I think we did very well, but it's not that we had unique ideas here. We had the first tech transfer office in the UC system. MIT and Stanford had tech transfer offices long before UCSD.

Kennedy: Well, the other thing that we were able to do during Dick's tenure was when he came here we had no capital program. Zero. There were no state dollars, there were no other dollars, except for dormitories, which the students supported. But over his chancellorship, when I was vice-chancellor we put over $1 billion in the ground. Some of it state funds. But we did the first debt-financed research building in the history of University of California, Nuremberg Hall.

Atkinson: We did it and it was not—

Kennedy: It was not easy.

Dynes: Not appreciated.

Atkinson: The president's office did not like anything they were doing.

Robbins: Why is that? Because that's an important building on this campus.

Dynes: Oh, but you have to go back to before it was done.

Atkinson: What's the name of that program, where the user—

Kennedy: Garamendi.

Dynes: Garamendi.

Atkinson: Garamendi, yeah.

Kennedy: That was invented here.

Atkinson: It was invented here, and we found people in the legislature that carry the bill. If the president—

Dynes: John Garamendi got his name.

Atkinson: If the president's office had known they would've killed us.

Robbins: So it sounds like you're saying that you freed up money, state money to subsidize something—

Atkinson: No, no. We freed up indirect costs from grants to use to fund buildings—we used indirect cost money to fund research buildings, which in turn would house more people doing research—

Dynes: Which would generate more indirect costs.

Atkinson: —which generated more money.

Dynes: Yeah.

Dynes: You understand that that can reach a limit.

Kennedy: Well, it does reach a limit, but at the time—

Dynes: At the time UCSD, these guys, their timing was impeccable and they sensed that the federal research grants were growing, and they could ride on the edge of that wave.

Atkinson: That is always a debate about taking on debt, how much can you take on. We were gambling in a certain sense that as we put money into the research buildings we would be able to attract people who would attract dollars and so forth.

Robbins: That worked.

Kennedy: Yes, it worked, but it's dangerous too.

Dynes: Yes, but other institutions, some local, have taken that bet and they have not been so successful.

Atkinson: Now, Berkeley has taken a big debt by redoing its stadium and they've put about $600 million into it. And that debt is killing them at the moment.

Dynes: Yes, because—

Atkinson: We've taken out of a lot of debt here in terms of student housing and the like, but that's all funded by—

Dynes: That's all funded by student fees.

Robbins: Right.

Kennedy: That's easy.

Atkinson: If Trump's budget went through and there was no money for research we'd be in serious trouble.

Kennedy: This place would be in deep trouble.

Dynes: Some trouble. I like a certain amount of trouble as well, just not deep trouble.

Kennedy: Oh, okay, define it any way you like.

Robbins: So time goes on—by 1996 you become chancellor.

Dynes: Yeah, I came in 1990, so.

Robbins: I'm sorry, well— *[Inaudible Crosstalk]*

Dynes: I came as a professor of physics, so that's important to recognize that there was a period of time when I was one of the faculty.

Robbins: Right. Exactly. And you were provost for—

Dynes: I was provost as well.

Robbins: All right. In 1996 you assumed chancellorship, having been here as faculty for about six years.

Dynes: Correct.

Robbins: All right. I'm just interested in what you were thinking about where the university might go at that point. So much had happened during the '80s and the first part of the '90s, what were you thinking about this campus?

Dynes: Well, I have to go back to my days at Bell Laboratories, because I lived in a what many people thought was an isolated research establishment, which was Bell Laboratories, but it wasn't. Part of the responsibility of the first and second level of administration at Bell Laboratories was, one, to continue to do research. But the other was to reach out to Western Electric and Long Lines and all of that, and understand what problems were out there that the research that was done at Bell Laboratories was applicable to. So I grew up in what I called then a problem-rich environment; there were more problems than could be solved. So it was a wealth. So when I came here that was ingrained in me, to understand that part of the success of the research was to be able to reach out and solve problems, issues. So I come from a very different background than a traditional faculty member.

Robbins: Okay.

Dynes: So I came in when these guys were running the show, and this is indeed a problem-rich environment. They had demonstrated how it can work. There were several things that were foremost in my mind about what we had to do during that period. One of them was build a management school, which we did at that time. But it had to be a unique kind of management school, which wasn't another traditional university management school.

Robbins: Why was it so important to do that?

Dynes: Because that was—well, look at the results. I think the results speak to the answer to the questions.

Robbins: Well, for the person who doesn't know the history, why was it important to create that kind of—

Dynes: Well, there needed to be a better avenue and vehicle for the intellectual property that was being generated and for the culture and the climate around UCSD that said this stuff is important on a university. So rather than law

school, the management school was higher on my agenda. Much higher on my agenda. So I didn't have the traditional university culture in my head. These guys made it easy for me, because I walked into something that was already existing that wasn't in other universities in the country. I knew that. I knew that they didn't exist in other universities in the country the way existed it here. Dick never believes me, but it's in part why I came here. He never believes this answer, but it's in part why I came here, because it was just a different climate.

Robbins: Why don't you believe him?

Atkinson: No, I—but, pharmacy and business were always on our agenda.

Dynes: I know they were.

Atkinson: You built a great school and you attracted Bob Sullivan, and that was exactly the way to go. But for, the UC system—I think those were the first two graduate programs that the university had started in about 25 years.

Dynes: Yeah, we rebuilt the cancer center, because it was in deep trouble. Then we built the pharmacy and we built—and you think about it, they were no-brainers.

Robbins: So it seems—

Dynes: It took money, but they were no-brainers.

Robbins: It seems obvious in retrospect, but for the average person listening, why was it so important to create pharmacy? Was it the explosion of drug development across America?

Dynes: Yeah. It was just a natural complement to what was already going on in UCSD.

Atkinson: You can't be the center of biotech and not have a school of pharmacy. In 1994, the National Research Council ranking of universities had us ranked number one in the pharmaceutical sciences before we had a pharmacy school.

Dynes: We didn't have a school.

Robbins: So it was a no-brainer.

Atkinson: Because we had superstar scientists in that area, but we didn't have a pharmacy school.

Dynes: We had a guy who was more than passionately committed to it, Palmer Taylor. There was a good relationship with UCSF School of Pharmacy, so there was already working motion back and forth—

Kennedy: We had pharmacy residents here from UCSF, goes way back to the '70s. Because I negotiated that deal with UCSF.

Dynes: You did. So it was already clear that Southern California, UCSD needed—that Palmer was passionate about it, and it was like filling a void. I mean it was just obvious.

Robbins: It sounds like it became a really rapid pipeline as well for the pharmaceutical companies. You're putting out pharmacists and pharmaceutical researchers in an area where there's Eli Lilly and all manner of companies.

Dynes: You know, all these companies recruit products from all over the campus, not just the school pharmacy. But they come from biochemistry, they come from all—they come from chemistry, physics, and in the school of pharmacy, I mean they're coming from everywhere. We also brought on at that time the La Jolla Institute for Allergy and Immunology. They were a small research group that were not located on the campus, and this research park over on the other side, over by the Moore's Cancer Center, and brought La Jolla Institute on there. My goal, and it took 15 years—my goal was to have them become part of the university.

Robbins: That's only a recent thing.

Dynes: That's very recent, yes. But they've been here. They've been in that building that was built by Kieran for 15 years.

Robbins: Right.

Atkinson: Really, in the 1980s we set aside a big hunk of property for a research park. Why? Stanford had a research park, we needed to have a research park.

Kennedy: Right. That was the first one.

Atkinson: But the Research Park idea goes—I mean the designation of that area and property goes back to—

Dynes: So an anecdote there, Dick, which you've probably heard, and that is that there was a golf driving range over there. Do you remember that?

Atkinson: Yeah, I never got to use it.

Dynes: Well, Ann did, my wife. She was really unhappy that we actually stripped it down and put buildings over it.

Kennedy: I remember we had to get a bill through Congress to get the designation of that land changed for educational purposes only. Clair Burgener was our congressmen in those days, and you worked with Clair to get the—

Dynes: That's right. That's right.

Kennedy: —legislation through. The land was deed restricted.

Dynes: But again, it became obvious in the sense that the environment—the climate was here, other people wanted to come. We built the Keck Imaging Center, which was right over there. We won that without breathing hard, because it was so obvious.

Atkinson: Well, supercomputer—

Dynes: Supercomputer center, another example that came under Dick. Again, it was so obvious that—

Atkinson: But, Bob, I would say what you did best of all was to recruit some superstars to the campus, younger people who turned out to be really stunningly—

Robbins: Such as?

Dynes: Larry Smarr.

Robbins: Larry Smarr, okay. What is it—I know Larry, but again, for people who don't know, tell us what Larry has done to advance biotech and life sciences.

Dynes: Well, he came as an astrophysicist. He was an astrophysicist, but he was already a computer scientist at Illinois, and he was recruited to head up CalIT2. It was Bob Conn and I that really spent most of the time recruiting him and his wife.

Atkinson: Of course, recruitment of Bob Conn was because we were going to have the fusion project here, and we recruited Bob to—

Dynes: I chaired the search committee. You asked me to chair that search committee.

Atkinson: Yeah. So that was a lot of things that just—

Dynes: It just all came. I'll say it again and I'll keep saying it. It happens. You get really good people, because really good people recognize that this campus and

the environs—not just the campus, but the environs are such that they can actually exercise their abilities and passions in a way that's very hard to do in almost all academic environments in the United States. Almost all.

Robbins: So in the last two years we've been seeing something evolve out of what you all created. There's been very large private donations come to the university. Denny Sanford gave $100 million because he wants to promote stem cell research. And Denny Sanford is an impatient man; he is very clear about the fact that he wants universities to work faster to get basic discoveries into the pipeline more rapidly, to get the therapies and drugs.

Dynes: Doesn't happen that way.

Atkinson: Well, I don't know.

Dynes: Okay, we could argue about this.

Atkinson: No, but we've got a lot of people who are very interested in doing that.

Dynes: Well, of course. But at the front end, at the research end, this is called research. You don't know where it's going to go. You may have an intuitive sense of what's important, but if you program your research, you have to design it to be transferrable to an application, it won't be often successful.

Robbins: Bob, I'm not downplaying basic research, I'm just saying that people like him have expressed a sense of exasperation with science in general; they think things should work faster. The US Government has said the same thing, NIH has said the same thing. They've pushed in—well, they—

Dynes: It doesn't happen that way. It just doesn't happen that way.

Atkinson: Yeah, but there are things that are—

Robbins: Yes, it—I'm going to disagree with you. Illumina has proved that it does happen that way.

Dynes: So let me go back to the electronics business, which I know very, very well. All right? When I was a physics undergraduate what I learned was how to design circuits with tubes, thermionic valves. There were no transistors; they didn't exist. The reason that that all evolved—I'll give you a Bell Labs-tainted answer. The reason all that happened was because people learned how to grow single crystals of silicon and germanium and zone refine them—you don't need a lecture on zone

refining, but it was a complicated way to grow these single crystals and sweep out all the impurities at the level that you needed for semiconductors. That took ten years.

Atkinson: It took history up until that point.

Dynes: Right. I mean it didn't need the purity of metals; it needed to be the purity of semiconductors, which is a million to a trillion cleaner than in metals. And that took people fundamentally understanding the materials and the physics and the chemistry of how to grow single crystals of silicon, of germanium, gallium arsenide, gallium antimonite, and all those III-V semiconductors. Dick's right. That took decades to learn how to do that. So if I decided to go to Bell Labs and learn how to zone refine silicon because I wanted to make silicon and MOSFETs, Metal Oxide Semiconductor Fuel Effect Transistors that took enormous amount of time to be able to grow that oxide defect-free. That's only five or six atomic distances apart, grow that without any defect, so you can put a gate on top, so you can control the electronics, and that is still evolving today. That is Moore's Law, and it just keeps on going.

Robbins: Okay. But sometimes things happen and they entirely change everything.

Dynes: Well, of course. That's true.

Robbins: Kary Mullis and polymerase chain reaction. My god, look what it's led to—Illumina. How fast they've gone, how little the machines are getting and how much power there is. Craig Venter and what he's doing across the street.

Dynes: Yeah. But what did Craig do before that happened?

Robbins: He helped sequence the Human Genome Project over a period of years, but accelerated the process.

Dynes: Correct.

Atkinson: That's true.

Robbins: But my question—

Dynes: But it took a series of years for him to do that.

Robbins: Yes, it did.

Dynes: That's the research part of it.

Robbins: All I'm saying is over the past four years more than $500 million has come into this Mesa in private donations from people like Sanford and Rady, and I'm forgetting the other person that put in the big money. And then the anonymous gift to Sanford Burnham, and it's been for stem cells, and people are pounding the table, saying, "It's got to go faster." This university has taken that money to create the Altman Building. So yes, some things go slow—

Atkinson: I guess I never heard that. I've never heard anyone say to me, "You guys aren't really working hard enough. You've got to do this faster."

Robbins: No, no, no. No one's saying not working hard enough. You're here—

Dynes: This is a standard complaint.

Robbins: Okay.

Dynes: This is a standard complaint, and it is by people who have been successful and think they're really smart—and they probably are. And think that you can somehow program basic research.

Robbins: But can you?

Atkinson: Well—

Dynes: No. *[Laughs]*

Robbins: Well, but—no, but you laugh, but if we look at—

Dynes: You can create an environment where people are driven to study certain areas, and then people will pick up what is created, those inventions, and drive it towards product. But you can't program basic science.

Atkinson: DARPA is a good example of an agency where they are looking for something that's just about to break out and they put the money in. So the Internet was a DARPA-NSF affair. You know, could we be pushing the scientists harder at a faster rate? Well yeah, if it wasn't so hard to get grant money and you didn't have to write so many applications for funding we could probably help a little. Maybe we shouldn't have faculty teaching as much as they do. I mean it's an environment and all I can say is it's been an environment that's worked very well. A research university environment at a place like MIT or Stanford or UCSD is a great environment for pushing discovery at a fast rate. Could it be done faster? Well, over time we've vetted all sorts of little variants, like the Bayh-Dole Law and other things that speed it up. But are we somehow sitting here ignoring what we could be doing if we just—

Robbins: All I'm saying, gentlemen, is that discoveries seem to be coming faster. In the past three years all we've heard about—

Atkinson: I thought you just told us they weren't going fast enough?

Robbins: No, I did not say that. *[Laughs]*

Atkinson: But everyone's complaining that they're not going fast enough.

Robbins: CRISPR, the CRISPR technology.

Dynes: Mm-hmm. But there's a huge, huge infrastructure of science that was laid out before CRISPR. I mean there's years of work before CRISPR.

Robbins: I understand.

Dynes: Okay. That's the point I'm making.

Robbins: But I'm just looking at biotech and life sciences in California and the nation over the past three, four, five years, and there have been these incredible advances. At the same time there have been advances we have heard philanthropists saying, "We really wish science"—they're not saying work harder; they're saying, "We wish that the application was done quicker," that they got there quicker. This goes back 50, 60 years; it's not just the past couple of years. They said it to the National Science Foundation when you were there.

Atkinson: I mean people always say it. The words that I usually heard when I was at NSF, "You're wasting all this federal money on this for—"

Dynes: Basic research.

Kennedy: Basic research, yeah.

Atkinson: Yeah. Why are you wasting money? Do stuff that's important?

Kennedy: Senator Proxmire.

Atkinson: Don't waste money on basic research.

Kennedy: I was telling him about Proxmire and the Golden Fleece Award. *[Laughs]*

Dynes: Yeah, without the environment of a dynamic group of scientists, engineers—scientists and engineers strongly interacting, these things that look like

breakthroughs won't happen. And you think, "Oh, well, this just came out of the blue." No, they don't come out of the blue.

Atkinson: CRISPR is a great example. What that's going to do is phenomenal. But I'll give you an example—Bob's heard this one before—the NSF would get these Golden Fleeces from Proxmire, and one was for a grant we funded called the Sexual Behavior of the Screwworm Fly. And a newspaper—you've heard this story.

Robbins: Yeah.

Atkinson: When I left NSF there was a congressional seminar on biological pest control, and that was a founding study that led to a whole new way of looking at biological methods for pest control. We're not spending enough money on basic research.

Kennedy: Yep. Correct.

Atkinson: The country is not spending enough money on basic research.

Robbins: Well let's put that into context. During most of this conversation you talked about how much this university grew in the early days as a result of federal money. Now here we are in 2017 and the most common complaint that I hear is that there's not enough federal money. Even so, the NIH budget did in fact double within the past 15 years, and it is currently about, depending on what year you look at it, $27 billion to $30 billion.

Atkinson: And we haven't solved cancer. And President Nixon had a war on cancer; we were going to solve cancer.

Dynes: That's right.

Atkinson: If we only would've worked harder and faster we would've done it.

Dynes: Never solved it.

Atkinson: That's why the Soviet Union does so well.

Robbins: But I hear so many scientists say that the federal government doesn't support science, when in fact the federal government and the taxpayers actually do. $30 billion is a lot of money.

Atkinson: That's the new growth theory. Now you're saying that—

Robbins: I'm just trying to be fair.

Atkinson: You're giving all this money to universities and they're just wasting the money.

Robbins: No, I'm not. No, I'm not.

Kennedy: But, I have another perspective. I don't know whether it's right or wrong, but if you look at the number of universities that now call themselves research universities, of which there are now about 150 of them, and I wonder, and I don't have the answer, whether we are funding all of the highest quality research, because there is a geographic—no matter what anybody says, there is a geographic distribution.

Atkinson: Well, we're forced to, to a certain extent.

Kennedy: I really think some funding is going to stuff that's not as good as it could be. That's just my thought.

Atkinson: Well certainly after the fact you can make that determination.

Robbins: Right.

Dynes: But not before the fact.

Kennedy: Well, I don't know about before the fact. I think you could make the argument.

Dynes: I passionately believe that if you don't have the infrastructure, the productivity of scientists and engineers—

Atkinson: And the young graduate students.

Dynes: —and the young graduate students, if you don't have that productivity, that dynamic that's going on all the time, everything else will die over time. Five years, 10 years, 20 years, it will all go away.

Robbins: Okay, but you have that. Six out of the past seven years this university has raised at least $1 billion in sponsored research. You rank, what, fifth in the United States in that category.

Kennedy: Presumably that's right.

Robbins: Well, those are the university's figures. So you're getting an extraordinary sum of money.

Dynes: Correct. We're doing extraordinary amounts of science and engineering because of that.

Robbins: You are. But you're not—

Dynes: We're spinning out extraordinary numbers of small startup companies. Go down to Sorrento Valley, just drive along Sorrento Valley.

Robbins: I live in Del Mar; I see—

Atkinson: Aren't we very high on number of patents? I've forgotten, we were—we're probably fifth in the country in terms of number of patents we've got.

Kennedy: I haven't looked at the numbers.

Dynes: So I interact with young people that come out of this campus, and there's a couple of companies, two, three companies, where I think of myself as the adult scientist, and I just spend time with them. These are kids who have bet the next fraction of their lives on ideas and they benefit from the infrastructure that's here, because they can get stuff done. There are people that move around, employees that move around back and forth in this environment that wouldn't exist if this environment that didn't happen. There are companies that are just going like that all the time.

Atkinson: But, the pharmaceutical industry—the big pharmaceutical companies have gotten out of research.

Robbins: They've gotten out of some research. They still do a lot of research.

Atkinson: They are doing less and less basic research.

Robbins: Okay. But that goes back to people who want drugs—

Atkinson: They've backed away from a lot of research. They're depending on universities like UCSD to provide those ideas that they can then translate into applications.

Dynes: So let me go back again to something I said earlier, but it's important right now in this context. In the world of my scientific expertise, General Electric, General Motors, Bell Labs, IBM, RCA, Exxon, Xerox, Kodak, all had premiere research labs. We used to compete with them. They're gone. They're all gone.

Atkinson: It's scary in a way.

Dynes: Mm-hmm. They're all gone. That role—if America is to remain competitive, that role has to be taken up by the universities, and to some extent the National Labs—and that's a separate conversation on National Labs. But that has to be taken up by universities. There was a huge flow of people—we would compete with IBM—Bell Labs and IBM. I had people from IBM call me up often, they'd say, "Bob, how do you do this at Bell Labs?" RCA, General Electric taught the US industrial research.

Robbins: Mm-hmm. Okay. So you're—

Dynes: And you read General Electric now it's all about shedding off. I mean today, in the *Wall Street Journal* I read the articles. They're just shedding off.

Kennedy: They're downsizing.

Robbins: I saw that.

Dynes: Downsizing, right. They're not talking about investing in new intellectual property in the future. They're talking about biz—Xerox, here's a good example, Xerox. It's one of my favorite examples. Xerox was a company in Rochester, New York, and they recognized that all these other companies, high-tech companies had research labs. So they said, "We've got to build a research lab." Well, we're not going to build it in Rochester because we won't attract people. We'll build it in Palo Alto, right?

So they built that research lab in Palo Alto. That research lab in a sequence of five or six or seven years invented the mouse, invented Ethernet, invented laptop computing. The board, the Xerox board said, "Eh, we don't do that. We're a copying company."

Atkinson: Another example that relates to this place is Kodak. There's a physicist named Jim Lemke. Do you know Jim?

Robbins: I know the name, but I don't know the person.

Atkinson: He had the idea of digital photography, started to develop the basic ideas, started a company called Spin Physics here in San Diego. It went along pretty well. Then Kodak came along and bought the company. He continued to pursue the technology, and after about five years they came to him and said, "Look, chemistry's our business, not physics. We're discontinuing our digital effort." So the Japanese beat us to the punch by—

Dynes: Right. So the point is that in that environment there were these industrial laboratories and universities and they interacted. Universities, we recruited people; people went back and forth. People left these research laboratories and went to the universities. Many of them. A lot of them. That's all gone. So that period of success in the US where at some level we owned the world, is gone.

Atkinson: Bob, in the '70s there was a view in industry that so much money was coming from the federal government to university scientists, that they had lost interest in being consultants to industry.

Dynes: Yeah, I wasn't here then. I was in England.

Atkinson: No, but that was sort of the trouble is Bell Labs was so unique, but that was one of the complaints, why bother to consult for industry when we can—

Dynes: When they've got all the people.

Robbins: So you're saying that universities have to pick up the slack, because these major—

Dynes: For America to continue to be successful.

Robbins: So what does UC San Diego need to become beyond where it is? It now has almost 37,000 students. It has $1 billion in research. It has a $1.7 billion expansion program right now. What does the university need to become over the next five or ten years to continue—

Dynes: I mean you're using slightly irrelevant quotations.

Robbins: They're your pictures.

Dynes: It has to continue to be the generator of new ideas and creative people who have the wherewithal to realize their ideas, and in an environment where they can actually nurture those ideas.

Atkinson: Well whether we like it or not, that depends on the federal government providing—

Dynes: Correct.

Atkinson: I mean, sure, there's money out there from foundations, there's money out there from industry, but the core money is federal funding, and all you have to do—I've often thought to myself, if the faculty ever were up in Sacramento or ever in

a legislative session in Washington they'd be horrified that their fate on research funding rested with, some of these crazy—

Dynes: Be careful. *[Laughs]*

Robbins: Well, and how are you going to carry that message to Congress and to the people that need to hear it? The reality is that science does a lousy job talking to the public and to lawmakers.

Dynes: I just don't think that's correct.

Atkinson: That's what—I don't—

Robbins: I do think that's correct.

Dynes: I just don't think that's correct. Dick and I are both members of the National Academy of Science. He's in National Academy of Engineers. I'm there at least once a month.

Robbins: I'm talking about science, not just individuals. You have a big—

Dynes: Well, let me finish.

Robbins: Go ahead, I'm sorry.

Dynes: Let me finish. The National Academy of Science's acts as science and of medicine and of engineering, act as advisors to the nation. Right now, just right now, for example, I'm chairing a study that is dictated by Congress, funded by the Department of Energy and NNSA on what do we do in a nation about plutonium dispersion. There's no other country in the world that has that kind of independent ability with scientists and engineers to do that.

Atkinson: But, Bob, if a president and the Congress decided to follow Gary's example, then you guys aren't doing the job you should be.

Dynes: That's correct.

Atkinson: Started cutting—

Dynes: If they listened to you—

Robbins: You're personalizing it.

Dynes: No, no, we're not. If they listened to you—

Atkinson: No, it's not personalized.

Dynes: If they listen to you, and you say what you just said, without the counterpoint, you're responsible for destroying it.

Atkinson: *[Laughs]* That's pretty good.

Robbins: Well, if you're so effective—

Dynes: You're responsible for destroying it.

Robbins: If you're so effective at doing it then why aren't you getting larger NIH budgets?

Dynes: You just argued that NIH doubled.

Robbins: It did—well, you know that it doubled.

Dynes: Okay. Well.

Robbins: Yeah, but I'm talking about the past seven years. I know when NIH doubled. But all I hear is faculty complaining that there's not enough federal money.

Kennedy: Of course. They're always going to complain, because they want more.

Dynes: So let me explain down in the grass what faculty do, because nobody knows what faculty do except faculty. Unfortunately, faculty spend an enormous amount of their time writing grant proposals and satisfying unfunded mandates that come from the federal government and the state government. Unfunded mandates. Mandates that say, "You've got to do this, you've got to do this, you've got to do this in order to meet the requirements to get this money."

Kennedy: And we're not going to financially support meeting the requirements.

Dynes: We're not going to pay for it, but you've got to do this. It is horrendous what the unfunded mandates are compared with what they were 30 years ago. For a variety of reasons, many of which you could argue are particularly good reasons, but faculty spend a huge amount of time, because they are the entrepreneurs. Faculty run little businesses on the UCSD campus, that's what they do. They have to assure the university, they have to assure the state, they have to assure the Feds, that they are following the mandates that are dictated to them by people who have no concept of what they do. Okay? Listen to those words. Play them back.

Robbins: I will.

Dynes: Okay.

Kennedy: This is one of the world's largest cottage industries. It really is.

Robbins: There's something that's bothering me about this.

Dynes: Okay.

[Inaudible Crosstalk]

Dynes: You haven't articulated it.

Atkinson: I will in a sec. It's an industry where, not the government sitting up here and giving some money to laboratory directors and laboratory directors giving some money.

Dynes: Right. It comes from the bottom.

Atkinson: It's a system that's peer-reviewed. [University scientists] don't get money from the chancellor and the chancellor gets money from the president, and the president—

Kennedy: Right.

Atkinson: These people have to compete in the [peer-review process].

Dynes: Each other.

Atkinson: —and you look at the competition at NIH or NSF, it's phenomenal. Now maybe we should be funding a lot more. I think we should be. But it's a peer-review system that's very different from other countries. Peer review, it's a tough, very competitive business.

Dynes: It's a tough business, and the ideas come, not.

Robbins: Well, it should be a tough business.

Atkinson: What do you mean it should be a tough business?

Robbins: To ensure quality.

Atkinson: Well, that's the point.

Robbins: Yeah, but you've read the same studies I have: the *Journal of Nature,* the *Journal of Science,* they've been talking in recent years about how a lot of [studies] can't be reproduced. Well, you laugh at it, but it isn't—

Dynes: Yeah, yeah, we're laughing, because—

Atkinson: There are scientists who are frauds. So why don't you clean up that business?

Dynes: So all of what you are saying is true. On the other hand, this is an industry which has kept America at the forefront.

Robbins: Agreed.

Dynes: And has kept new companies being created. It nurtures entrepreneurs and it nurtures people that are willing to bet the next 10 to 20 years of their lives to do this.

Robbins: I don't think Bob understands that we mostly agree on everything.

Dynes: Every once in a while you make statements which I dread if I see them in newspapers. Because I've seen this.

Robbins: I think that there are times when some of the most effective advocates for funding in American research aren't you guys, they're the public. The AIDS crisis is a clear example of that. Congress turned on that not because of the scientific community primarily, they turned because of this massive political movement in America.

Dynes: Can I interrupt right here?

Robbins: Yes.

Dynes: If that transition didn't have the infrastructure of science underneath it we would not be where we are today.

Robbins: I agree with you, Bob. But you have to recognize as well, though, that it was this public movement that pressured the administrations for money to get to those researchers.

Dynes: If somebody dropped a bomb on us—

Atkinson: Oh, thank god we can resist that public pressure, because that public pressure is the public pressure. I go back to the Nixon's war on cancer. It's the last thing we needed. We needed more research on fundamental biological processes. We didn't have the basic knowledge to have a war on cancer.

Dynes: To win that war.

Atkinson: The Crick and Watson research was in the 1950s. Now, we have several companies that are using gene modification procedures. I mean these ideas, it takes time. It takes ideas. The danger that this country is in, and I think it can happen anytime, is for people to come to the view that we need to do things not in terms of basic research, we need to do work that really counts, so let's concentrate.

The fact that NIH gets a lot of money is because a lot of people want to see cancer cured. NSF has had a hell of a time getting its funds, but every so often the Congress—a few people in the Congress will step in and say, "Double the NSF budget. It's really critical" and there's something—the Internet or something leads to that. But there is the danger in the United States that it could all come apart quick time.

Robbins: Dick, I honestly agree with everything you just said. But let me ask you one question: why did Nixon call for a war on cancer? What was the purpose of it?

Atkinson: Well, political. He thought that was a great thing to do.

Robbins: Didn't he also think that that was something that the public deeply wanted—

Atkinson: Yes. Yes. Yes.

Robbins: People felt so frustrated that so many people—

Atkinson: Yes, yes, yes.

Dynes: What you just said is not inconsistent with political.

Robbins: Well, I understand. I'm just trying to get the reasoning behind it.

Atkinson: But, how we execute a war on cancer depends. Fortunately much of the money went for basic research. Now if we had put it all in these applied laboratories we would've been—

Robbins: I understand. That's why I'm drawing a direct line between what happened then and this movement more recently by philanthropists to say, "Translational research. Translational research."

Nixon was talking about an emotional need in America. Translational is being talked about because American society is getting older; there are more people with Alzheimer's and dementia, people are desperate for solutions, more people living in assisted living. So I kind of get that.

Dynes: Okay. So then we agree.

Robbins: I think we do agree.

Dynes: If you don't have the underlying science there's nothing you can translate.

Robbins: I think in this entire conversation you think that I don't support basic research, when I do.

Atkinson: No, no, no, we're not—I mean we love—

Robbins: He's pulling my chain.

Dynes: Yeah. Well, it's kind of fun. *[Laughs]*

Atkinson: By the way, there's a connection to Bell Labs here. Nixon's science advisor was Ed David.

Dynes: Ed David, right, he came out of Bell Labs.

Atkinson: Nixon fired him. Why did he fire him?

Kennedy: Is there a science advisor right now?

Atkinson: No.

Dynes: No, there's not.

Atkinson: That's another problem.

Robbins: There is not.

Dynes: There is no science advisor.

Atkinson: That's another problem.

Robbins: I didn't know how willing you guys were to wade into this, but let's go there.

Dynes: No, I think [Gary] should answer this question on Ed David.

Atkinson: But I haven't told my story.

Robbins: Okay.

Atkinson: So why did he fire Ed David? Well, Ed David advised [Nixon] that supersonic commercial planes were not an effective way to go, and he wanted to do supersonic. Nixon began to hate the universities because the universities were up in arms about the Vietnam War and so he fired his science advisor. But why did I want to tell that story?

What I'm saying is the politics of the country do scare me. We could be really in trouble if the attitude was that we don't need to do research, that there's a lot of fraud in research. By the way, the scientists themselves have identified a number of people who are fraudulent. There are frauds in research. But, you know—

Dynes: Yep. We find a lot of them. The scientific community finds a lot of them.

Robbins: What do you think will happen over the next year or two, given the political climate in America? Is funding likely to erode? What is likely to happen? We've seen already changes with the EPA and science, so what do you think is going to happen?

Atkinson: I think that it's a fundamental understanding in the leadership of the country that science is important. But if that fundamental understanding came to the view that basic research should be done somewhere else, not in universities. That would be an interesting moment.

Dynes: I think when you see people working on budgets you don't see people in DC slashing science budgets. They understand. Some of them have been around a while, they've had a lifetime of having seen what we're arguing with you about, and that is that the basic science has to be there or you won't have the scientists ready for a Manhattan Project. They won't be there.

Robbins: Do you feel the same way?

Kennedy: I agree.

Atkinson: On the other hand, there's NASA. Let's have a NASA flight to Mars. Well, god, where's the money going to come for that? Well, it may come out of the basic research budget.

Dynes: So these are things that we constantly worry about. I lived in this nirvana, which was Bell Laboratories, where we would show up, and what I didn't know at the time was that we were hired in areas where some people had great vision. You probably know this now too. They hired us because they wanted people

that had vision. They thought they knew where AT&T was going before the antitrust. They hired people and put them together. When I first went to Bell Laboratories I worked in an area of electron transport and super connectivity. The guy next door to me was doing molecular beam epitaxy, and he was growing materials, which ended up being gallium arsenide lasers. The guy down the hall was learning how to draw optical glass fibers. There was an applied mathematician who was doing bit compression algorithms. We thought we were allowed to do whatever the hell we wanted to do. And we were. It just so happens we were hired to work in areas that ended up in optical communications.

Atkinson: Bell has always had great leadership. But they also had a hell of a lot of money. They were a monopoly and they had so much money—

Dynes: They did have money.

Atkinson: —they could afford us.

Dynes: They did.

Atkinson: I mean that was the Vannevar Bush argument, industry cannot afford in the long run to support basic research.

Dynes: And it took an antitrust suit to destroy it.

Robbins: Last question. I promise, last question.

Dynes: Okay.

Robbins: So this county is really big in biotech and the life sciences. I periodically see stories here in the press saying that, "Well, could we also become as big or important as Silicon Valley in those disciplines?" What do you think? Can this county expand beyond biotech/life sciences to also become as large and relevant in the information sciences?

Dynes: Well, I think we—

Atkinson: I think we— *[Inaudible Crosstalk]*

Dynes: —I think we are. We are.

Robbins: Well, you're not. I mean—

Atkinson: We don't have the app—

Robbins: You don't have Google. You don't have Facebook. You don't have—

Atkinson: No.

Robbins: Well, no, but still—

Atkinson: Yeah. And we may lose Qualcomm before _____.

Dynes: We may lose Qualcomm. Have you looked at the vast amount of gaming industry that's here in—?

Robbins: Yes. Particularly at Irvine.

Dynes: Okay. Well, all through Southern California, down through Northern San Diego County.

Robbins: Right. When I talk to computer scientists here, they seem to want this to be Silicon Valley 2.

Atkinson: For the computer sciences, why is Illumina in San Diego? Bill Rastetter came—he was tied into the Royston Hybritech. Why did he come down here? Because it was a better place than to be in Silicon Valley. You go up to Silicon Valley today, the cost of housing, the cost of living, the chaos of driving in the area is just phenomenal. These companies, more and more of them are going to come down here.

Robbins: You just described La Jolla.

Dynes: No. No, no, no.

Robbins: Look at the cost of housing in—

Dynes: When was the last time you tried to drive around the Bay?

Robbins: Okay, I will give you the driving. But the cost of housing?

Atkinson: Well, that's one of the advantages we had in the early days of UCSD, housing was cheap.

Dynes: Oh no. So, I—let me argue with you. Go look at the zip code of La Jolla and ask where that is in the top 20. Gosh, you won't find it. Do that. No, do that.

Robbins: Well, the reason I'm bringing it up is you—

Dynes: You won't find it in the top 20 expensive places.

Atkinson: What's the question? I don't get it.

Robbins: Right. I'm just wondering—

Atkinson: Are we ever going to be Silicon Valley?

Dynes: Didn't like that.

Robbins: I'm just raising it because I keep seeing these stories about it and I've heard some faculty talking about it. So you guys have lived a life of looking at that. Is it coming or is it—

Atkinson: Larry Smarr has been responsible in creating some of the companies there.

Dynes: Yeah.

Atkinson: You know, I don't know what you want. Do you want us to say that yes, we're going to be another Silicon Valley?

Robbins: I'm asking you what you think.

Atkinson: I guess my view is we're different and better in many respects.

Dynes: Yeah. Actually there are places around the world, there are entities, there are countries, there are communities around the world, and I've spoken with lots of them, not all of them, and they said, "We want to be another Silicon Valley."

Robbins: I hear that.

Dynes: That is such a mistake. You cannot replicate Silicon Valley, just as you cannot replicate Sorrento Valley. Or the research triangle; you cannot replicate them, you'll just go down a black hole if you do. Because each one is different, each one nurtures from its own environment, its own culture, its own set of buttons.

Atkinson: But the successful ones have a university there that's—

Dynes: The successful ones have a university.

Kennedy: Well, the other places have tried and failed, like some of the—

Dynes: Many have failed.

Kennedy: —Florida. Florida cities that have tried to replicate.

Dynes: Many have failed.

Atkinson: I know.

Dynes: Many have failed, but if they think they can make a Silicon Valley, and that just won't happen. You cannot reproduce one of these.

Atkinson: I gave a talk recently about the Association of American Universities (AAU), [a group of universities that regard themselves as the top research universities].

Dynes: That's 60.

Atkinson: Something like 60 universities.

Dynes: Yes.

Atkinson: I looked at the football rankings—this was a week ago—and asked how many of the top ten teams are members of the AAU.

Dynes: Yeah, I don't know the answer. Probably not many.

Atkinson: Two. Alabama and Clemson lead the list.

Dynes: They're not top—they're not in the AAU.

Atkinson: The only two [universities in the top 10 that are also AAU members] were Penn State and Michigan.

Robbins: Dick Atkinson, you are being so elitist at this moment.

Atkinson: It is elitism.

Robbins: I've got to call you out on this. Here's a reality—I keep breaking the chancellor's chops. I tell Pradeep, "When are you going to have football? When are you going to have football?" What I'm really saying—

Atkinson: Are you serious?

Dynes: I hope never.

Atkinson: He won't answer that question seriously.

Robbins: But what I'm really saying is when are you going to create more of a social life in this community that helps lead to alumni—

Dynes: Wait. Whoa, whoa, whoa, whoa, whoa, whoa, whoa.

Robbins: —that leads to alumni donations, because you need money?

Dynes: Will you let me answer that question?

Robbins: Yes. You didn't let me ask the question.

Dynes: Yeah, no, but you triggered. There's a trolley coming up here.

Robbins: Yes, there is, 2021.

Dynes: That will not create more of a society, a social life here on the UCSD campus? Of course it will. Students will be coming and going in a way which is very different than in the past. Like it or not, that's going to happen, and that's going to change the nature of society in this region of San Diego County.

Atkinson: But we are at a disadvantage in terms of fundraising; we don't have the alumni that a USC has.

Dynes: It's coming.

Atkinson: I mean they're all for—

Dynes: But it's coming.

Atkinson: No, of course it's coming.

Dynes: Yes. Yes.

Atkinson: I remember [in the 1980s] going to a foundation in San Francisco and basically the president said, "You guys are like Stanford was in the ['50s]. It'll come, but it's going to take time."

Dynes: Right. Right.

Robbins: I'm not sure about that. You have 170,000 alumni, the reality is many of them are doing very well.

Atkinson: Goddammit, Gary, I don't like your attitude.

Robbins: No, when you talk to the alumni, and I've talked to your alumni director—

Atkinson: Yes, how bad we are.

Robbins: What they say is that the university has failed to connect in meaningful ways with existing alumni.

Atkinson: That's—you're damn right we failed.

Kennedy: That's an excuse. But that's an excuse, come on.

Atkinson: No, no, but when I got here we didn't even have a record of our alumni.

Kennedy: I know. But how much money did we spend tracking all of the alumni down over the years.

Robbins: But I looked last year and you guys still didn't have a good way to track your alumni. You hired that person who came in to take over, but as of a year ago you didn't have good records.

Kennedy: I personally think it's an excuse more than anything. I swear to god I do.

Atkinson: *[Laughs]* Well, it's a historic—in the old days we were not a great place for students, except for academics.

Kennedy: Well, in the old days, I would agree with that.

Dynes: But I would argue that if you look—I mean I won't disagree with you, but I would say look at the derivatives. Do you know what derivatives are? The rate of change.

Robbins: Sure. Okay.

Dynes: Look at the rate of change of donations from alumni and the engagement of alumni. Look at how the rate of change of that over the past five to ten years. And it's rising rapidly. So in time that will not be an argument that you can use.

Atkinson: With all the engineers we're producing, the income level of our graduating students is one of the highest in the country.

Dynes: So the rate of change is—

Atkinson: No, seriously.

Robbins: Wouldn't it just be easier to start a football team?

Atkinson: What?

Dynes: No.

Robbins: Wouldn't it be—

Kennedy: A football team is not the answer.

Dynes: No, let me give you the example.

Robbins: I'm trying to provoke him.

Kennedy: Alumni that give for football teams give to athletics, they don't give to the university in general.

Dynes: So let me give you the classic example. Berkeley. Who's going to pay for that stadium?

Robbins: The public, right? Isn't that eventually going to come down to the public, or are they going to have to go the donor route?

Kennedy: No, it can't come out of public funds. It's got to come out of non-public funds.

Dynes: Who's going to pay for that stadium?

Atkinson: Do you have an answer, by the way?

Dynes: I do not.

Atkinson: I was wondering. I thought I was going to get the answer.

Dynes: You know I was opposed to that from the start.

Kennedy: So was I.

Atkinson: Well, those are things that happen. *[Laughs]*

Kennedy: We were all opposed to it.

Dynes: You're talking to people who are opposed to that.

Robbins: Do you have any closing thoughts for this delicious—to our argument?

Dynes: So I just, I want to ask a question, which will be on the record.

Robbins: Okay.

Dynes: That is you're a newspaper person.

Robbins: Yeah.

Dynes: So you're not doing this for the goodness of the world.

Robbins: I am doing this for the goodness of the world.

Dynes: Okay. So we're not going to see these quotes in the newspaper?

Atkinson: What quotes?

Robbins: No. I did this for a simple reason—

Dynes: *[Laughs]* I love to pull your chain.

Robbins: I adore Lynda. She has helped me time and time again—

Dynes: This is all on tape, right?

Robbins: —with stories. I would do anything. Plus I wanted the opportunity to talk to you guys, so.

Dynes: Thank you, Gary. I just wanted to hear you say that. I'm wise to the ways of the world.

Robbins: You're wise to the ways of the world, but I'm not sure you're wise to the ways of what my job is as a person in the world.

Atkinson: Let me just comment—

Dynes: Good. Then I stand corrected.

Atkinson: [The distribution of federal funds for university research is quite skewed. The top 20 universities receive about 50% of the funds, and the top 70 universities receive about 85% of the funds.]

Kennedy: But they're not willing to make the investment, that's why. You have to make the investment, Dick.

Atkinson: Well, they would say we're not making the investment because we don't have the money. If you gave us the money, we'd make the investment.

Kennedy: No, no, no, no, but we didn't—nobody gave us the money.

Atkinson: But that's what the Congress is saying.

Kennedy: We figured out how to do it. We took risks and we did it.

Dynes: Yeah, you need the seed.

Atkinson: I started a geographic distribution program at NSF.

Dynes: Did you start that?

Atkinson: Yep, I started it. Why? Because, we had—

Kennedy: Because you had to.

Atkinson: That's how—

Kennedy: Because Congress said.

Atkinson: That's how Senator Kennedy and—who's Utah's senior senator?

Dynes: —senior senator from Utah?

Atkinson: Hatch, that's Hatch. Hatch and Kennedy got together. I had a Mormon on my staff—well, it's too long a story. *[Laughter]*

Dynes: Yeah, it is.

Atkinson: —I take the issue of whether we as a nation are going to continue to support the kind of system we have for basic research is really going to—

Dynes: I worry about it too. We've lost one-third of that still in industrial research.

Robbins: What you're saying here is not lost to me, and for kind of an odd reason. Four years ago I had a heart attack. I ended up in the hospital across the freeway.

Dynes: Which one?

Robbins: Yours. And when they were working on me—

Atkinson: In the new hospital? You were in the new one?

Robbins: No, not the new one.

Atkinson: But the Thornton Hospital?

Robbins: Thornton, yeah. So when this is all going down and they're checking whether—what do they check on? There's something they check that's a signature.

Dynes: For a heart attack?

Robbins: Yeah. You think I would know this. I was astonished by how rapid they were and what the tools that they had and what they could tell within minutes. That was all built over time.

Dynes: Mm-hmm. Yep. Medical instrumentation. And knowledge.

Robbins: And the chemistry and the biology.

Dynes: And the biology.

Robbins: So I have a very deep appreciation actually for this university and for basic research. Basic research kept my mother alive probably three years longer than maybe she should have lived, because her quality of life was so bad.

Dynes: Basic research is going to have a huge—has had and will have a huge effect on cancer. Basic research comes out of allergy immunologies and things like that. It's going to have a huge effect on cancer.

Atkinson: Now the question is if we had a structure like the French or the Russians have, I mean of institutes separate from universities, funded directly by the government, what could've been the outcome of World War II? We don't have an experiment that can compare the two methods, but what we can observe is just how well our method has done versus other countries.

Dynes: But we have a pulse in time, which is not a good example, but it is an example. That is that the Manhattan Project drew people from the two UCs, the University of Chicago and the University of California. It drew faculty. They did remarkable things in a time of great need for the nation. You can argue about all the—

Atkinson: But it was a university-driven activity.

Dynes: It was university. That's the point.

Atkinson: Mm-hmm. They contracted out to a couple of companies.

Dynes: Then they went back. Most of them went back to their universities afterwards.

Robbins: Keith Brueckner was part of that.

Dynes: There were lots of people.

Atkinson: Who?

Robbins: Keith Brueckner was part of it.

Dynes: Yes. Herb York was part of that.

Atkinson: Sure. I mean the key—

Robbins: He was one of the Jasons.

Dynes: But there were lots of people, almost all are no longer with us, but there were lots of people who were drawn to Los Alamos, did what they felt they had to do and then most of them went back to the university.

Atkinson: But, there is the issue, we require that we publish in publicly available journals. There is the issue that a lot of other countries can live off of our research. We've been so good so far that it didn't matter, but the Chinese are putting a lot of money into research these days.

Dynes: You're triggering— Ralph Cicerone and I used to have these conversations a lot, because he was making agreements with the National Academies of various countries in the world. I said to Ralph, I said, "Ralph, how are you going to resolve the global diversity of scientific integrity?" We had a lot of conversations about that.

Robbins: I knew Ralph. I really liked him.

Dynes: So did I. So did Dick.

Robbins: This has been fun and enlightening, and I really appreciate your time and I know you tried to pull my chain, Bob Dynes. *[Laughter]* So does Dick. My favorite story about Dick Atkinson happened two or three years ago. I did that story about why people decide to continue working after 75.

I came by his office and I explained what I was doing, and he said, "Get out of my office. I don't want to talk about that." I turned towards the door and he says, "Get back here. I heard a piece of gossip, I want to know if it's true or not." *[Laughter]*

Dynes: Yeah, that's Dick.

Robbins: So that's my favorite Atkinson story.

END INTERVIEW

Recommended Citation:

Atkinson, Richard; Robert Dynes; Wayne Kennedy. Interview conducted by Gary Robbins, November 13, 2017. The San Diego Technology Archive (SDTA), UC San Diego Library, La Jolla, CA.

The San Diego Technology Archive (SDTA), an initiative of the UC San Diego Library**,** documents the history, formation, and evolution of the companies that formed the San Diego region's high-tech cluster, beginning in 1965. The SDTA captures the vision, strategic thinking, and recollections of key technology and business founders, entrepreneurs, academics, venture capitalists, early employees, and service providers, many of whom figured prominently in the development of San Diego's dynamic technology cluster. As these individuals articulate and comment on their contributions, innovations, and entrepreneurial trajectories, a rich living history emerges about the extraordinarily synergistic academic and commercial collaborations that distinguish the San Diego technology community.