The University of California, Santa Barbara

ARPANET and the Politics of Science at Three Californian Universities

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Introduction

Following World War Two and the onset of the Cold War, the United States university system underwent significant changes, manifested in a new relationship between the Federal government and academia. The war-time projects that the universities were involved in, such as the Manhattan Project that built the atomic bomb, set up a model for large-scale mode of doing research -- "Big Science". This allowed for the creation of large scale laboratories, the production of larger numbers of physicists and engineers, and funding for much more expensive projects.[1] Following the end of the war, the Department of Defense continued to sponsor research at universities across the U.S, emerging as the largest patron of science in the country especially in engineering and physical sciences. From the late 1940s to the 1950s almost three-quarters of federal investment in scientific research came from the Office of Naval Research (ONR), although a substantial portion of this funding went to those engaged in "basic research", which did not have an immediately obvious defense application. A related effect of this "mobilization" of higher education in the US was the growing emphasis that universities placed on the natural sciences, primarily, physics and engineering.

In the aftermath of WWII, many universities in California developed into powerhouses of research, aided by an increase in federal funding made available to select universities. This drove them to create substantial departments of engineering and physics, which allowed them to take on future research projects. Much of this funding was channeled through military agencies such as the Advanced Research Project Agency (ARPA), the United States Air Force, and later the CIA, and was conditional on military applications of the funded research.[2] One of ARPA's

[1] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013, 41

[2] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017)

projects, the ARPA Network, connected computers at various research universities across the country in a network to allow for easy sharing of information. The ARPA Network was conceived throughout the late sixties, and eventually grew into a full-scale project, with the first message ready to be sent across the network in October of 1969.[3] The project began with four initial nodes: the University of California at Los Angeles (UCLA), Stanford University, the University of California at Santa Barbara (UCSB), and the University of Utah. Each node worked on a specific research project that contributed to the overall success of the project. While both the UCLA and UCSB ARPA Network projects were conducted by university departments, the project at Stanford was run by Stanford Research Institute (SRI), which was associated with Stanford at the time of the project but would later separate to become its own entity.[4]

This thesis situates the story of the ARPANET within a larger story of the transformation of California and the universities in this region in the era of post-WWII growth. Focusing on the early history of ARPANET in three Californian universities -- UCLA, UCSB, and Stanford -- I will investigate how the larger trends have manifested themselves in these particular places.

By the end of 1960s, when the ARPA Network was fully operational, the Vietnam War ended the implicit consensus that rationalized a peace-time mobilization of universities in the name of the national defense. Student protests in 1968 and 1969 targeted military-driven scientific research and defense-related "hybrid" institutes with strong links to the defense industry. Even before this sudden increase in activism, national scientific priorities had begun to change under Lyndon Johnson's presidency. The story of the ARPANET was intimately affected by these changes.

[3] Janet Abbate, *Inventing the Internet*. (Charlesbourg, Québec: Braille Jymico Inc., 2003)
[4] "Coalition Calls Campus Forum to Block Severance of SRI", *The Stanford Daily*, 1 April 1969

In this thesis, I use the first three nodes of the ARPA Network, all of which are located in California, as a vantage point from which to study how ARPA Network project fitted a story into of science and technology throughout the 1960s. I explore why exactly these specific campuses in California were chosen, and what specific factors drew researchers and others involved to the project. By examining these questions, this thesis connects the history of ARPA Network to that of the transformation of Californian universities, particularly in relation to the creation and growth of new scientific departments and elucidates the role of the ARPA Network in the history of each of these three universities. How was the ARPA Network different from the staple Cold War projects sponsored by the Department of Defense, such as nuclear weapons, space exploration, and electronic computers? Was it different? I also examine the differences in the implementation of the ARPA Network project at different California campuses. By looking at the writings and internal memos of those directly involved in the ARPA Network project, I examine the goals of the sponsors and the ways in which people who made it work aligned these goals with the local agendas. With this background in place, I ask what role did the ARPA Network play in student protest movements at UCLA, UCSB, and Stanford.

I: World War II and the Mobilization of the Universities

The entrance of the United States into World War II marked a distinct shift in the relationship between industry, universities, and the federal government. With companies like Lockheed Martin establishing their reputations through the manufacturing of aircrafts for the war and the acceptance of defense funding, U.S universities also began to seek out these sources of funding and began to contribute their scientists and resources to the war effort, working in large teams in scientific laboratories to develop war-related projects like radar and the atom bomb. While this was initially made possible by industrial changes that had occurred across the country, it was especially evident in California, with its growing aerospace industry and the development of both specialized training programs, and in some cases, the creation of entirely new universities. These changes were not limited to the war years however, and the mobilization of the universities continued long after World War II had come to its conclusion.

This mobilization of U.S universities, especially in California, was aided by changes to the technological landscape that occurred throughout the state. In particular, the changing labor history of the region factored into California's rise to prominence in the years following World War II. The region was considerably reshaped by the aerospace boom beginning in the 1920s and continuing up until the 1980s.[5]. By 1980, Southern California alone was home to 40% of the nation's missiles and space business, and over one-third of the nation's aerospace engineers.[6] The rapid growth of companies in the aerospace industry contributed to the growth of the Silicon Valley, the transformation of the universities, and the development of California into the

[5] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017). 69
[6] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017). 1

high-tech nexus we know today.[7] The growth of these two areas was significantly aided by ongoing changes to Californian universities.

The universities played a major part in the development and growth of the aerospace industry in California. While the University of California, Los Angeles (UCLA) and the University of Southern California (USC) were already well established, the additional skills and technologies that the aerospace industry required necessitated the creation of new technical programs at already these established universities and the establishment of new universities, such as the University of California, Santa Barbara (UCSB), which transformed a small liberal arts college, the Santa Barbara College, into the university we know today.[8] This early growth of the aerospace industry increased California's reputation as an industrial powerhouse, along with developing the reputations of the universities that were so vital for the growth of the region.

These new links between the aerospace industry and universities were reliant on a variety of factors. These included a rapid population growth, the rise of new industries, and more readily available sources of federal and industrial funding due to these new industries. A series of essays edited by Peter J. Westwick, *Blue Sky Metropolis,* tracks the development of California as an industrial powerhouse, chronicling the interconnected rise of the aerospace industry and the population growth that the state experienced as a result of outside factors like the influx of workers who fled the Dust Bowl and sought jobs in California in the early 1930s.[9] The collection offers insights into California companies, universities, and government relations, all the while providing the social and political backdrop throughout the various case-studies. The growth of population in the state, initially driven by Dust Bowl refugees relocating to California in search

[7] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 2
[8] David L. Chavez, "UCSB Computer Center One of Best in U.C. System", Office of Public Information. UCSB Special Collections. Subject Files. Box 17. Computer Center 1970-1987
[9] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 64

of work, created a new labor force that was available to work in the aerospace industry. Along with these refugees, the growth of the defense industry and new abundance of defense contracts served as a powerful incentive for migration to California.[10] The rapid growth of the California population ensured that people were available to fill new positions created by the aerospace industry. Following the end of the war, California's war-time investment in the aviation industry ensured that the necessary groundwork had been laid for more government support, allowing the state to provide for its increased population.[11] As California received more defense dollars than any other state, and had a consistently growing population, it was primed to become a key playing field in the post-war United States.[12] As aerospace companies were closely linked to the Department of Defense (DOD) in the years following World War II, the state of California and the federal government became more deeply intertwined than they had previously been. This intersection carried over to universities throughout California, allowing them to create these programs that were specifically tailored to meet the new demands of industry and the DOD.

Universities across California mobilized to meet the demands of the aerospace industry through the creation of new programs and campuses. Supplemental education programs, such as classes on blueprint reading and electrical assembly, were not new to California. During the Great Depression in the 1930s, the aircraft industry and manufacturers adapted to their new situation by taking advantage of new academic programs that produced engineering graduates.[13] While the university system played important role in the growth and development of the region

[10] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 64
[11] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 249
[12] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 250
[13] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 61

in the interwar years, its role increased dramatically after WWII.[14] The University of California at San Diego (UCSD) is a case in point, as the aerospace industry played important role in its creation.[15] As a part of General Atomics' plan to grow as a company, members of the corporation proposed a center to study nuclear power, and offered General Atomic staff as free part-time faculty.[16] UCSD is just but one example illustrating the role of demands of the aerospace industry in the expansion of university campuses. Similar developments can be found across the region.[17] This effect can be seen on the campuses of Stanford University, the University of California, Los Angeles (UCLA), and the University of California, Santa Barbara (UCSB).

There is no better place to demonstrate changing attitudes towards the mobilization of the universities throughout this period than Stanford University. In her book *Creating the Cold War University*, historian Rebecca Lowen tracks the rise of Stanford from the years prior to World War II and throughout the Cold War. The book chronicles the changes that occurred on Stanford's campus, discussing how sources of federal funding became so deeply entangled with the research conducted at Stanford, and how reactions to this changed over time, from the perspective of both the administration and students. By tracking Stanford's history over most of the twentieth century, Lowen reconstructed the changes in perception towards the role of the federal government in a private university, pointing out the political and social changes that may have influenced these ideological shifts. In the 1930s, university administrators became increasingly concerned with what they saw as the decline of Stanford's reputation. Their solution to the crisis was industrial patronage and prioritization of research that could have commercial

[14] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 60
[15] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 141
[16] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 140
[17] Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017), 139

value.[18] At this juncture, usual concerns about the intersections of the private university and government funding became less prominent. In fact, some faculty, like Frederick Terman, the Dean of Engineering,[19] arrived to a conclusion that the best way to improve the reputation of Stanford, along with improving its finances, was to create a government sponsored research program that would be fully integrated into the university.[20] These changes reflect both the increased reliance on federal funding that many universities adopted, and marked a key point in the growing mobilization of U.S universities. Stanford now possessed the infrastructure to take full advantage of contracts when they became available. While not all universities acted in exactly the same way as Stanford when it came to the intersections of the university and defense spending, it provides a vital blueprint for what a university could look like at the time, and how government funds could be used to repair or completely rebuild the reputation of a university.

The economic instability caused by the Great Depression further pushed universities to seek out additional sources of funding. Economic conditions across the country and a lack of students able to pay student fees pushed Stanford leaders and faculty members to look for sources of outside funding. It was not until the outbreak of World War II, however, that this funding became specifically for defense-related research.[21] Despite federal funding contracts being potentially available to both private and public universities, a large number of private universities rejected this theoretical source of funding, arguing that private schools could only truly be private if they were free from any political influence.[22] By the end of the 1950s, many

[18] Rebecca S. Lowen, *Creating the Cold War University: the Transformation of Stanford*. (Berkeley, CA: Univ. of California Press, 2010)
[19] Rebecca S. Lowen, *Creating the Cold War University: the Transformation of Stanford*. (Berkeley, CA: Univ. of California Press, 2010), 98
[20] Rebecca S. Lowen, *Creating the Cold War University: the Transformation of Stanford*. (Berkeley, CA: Univ. of California Press, 2010)
[21] Lowen, Rebecca S. *Creating the Cold War University: the Transformation of Stanford*. Berkeley, CA: Univ. of California Press, 2010. 18
[22] Lowen, Rebecca S. *Creating the Cold War University: the Transformation of Stanford*. Berkeley, CA: Univ. of California Press, 2010. 32

faculty and heads of universities began to increasingly rely on the federal funding and grants provided by the government or defense agencies.[23] This introduction of additional sources of funding would significantly change the relationship between private universities and the federal government.

Often, the newly established relationship between federal agencies and the universities led to the creation of the hybrid institutes such as think tanks, which were funded by the defense agencies and maintained close ties with a university. At Stanford, a local think tank was the Stanford Research Institute (SRI). Located in Menlo Park several miles from Stanford University, the SRI was established by the trustees of the university in 1946, with the intention that its research goals would align with that of Stanford Universities regarding the advancement of scientific knowledge, and the benefits to the public outside of the university.[24] Receiving almost no funding from Stanford, the first director of SRI, William Talbot, secured federal contracts instead. He secured the first federal grant during World War II from the United States Department of Agriculture to look at sources of rubber, marking the first departure from Stanford's established ideals.[25] After WWII, SRI firmly established it financial source-base through the governmental contracts. The US Air Force, an important patron of scientific research in this period, funded research relevant for the expansion of the aircraft industry.[26] The SRI conducted several of these studies. The SRI also served as Stanford's a channel for federal funding following World War II.

The nature of the relationship between the SRI and the university was a matter of constant negotiations and renegotiations among Stanford's leaders as they tried to define the role

[23] Lowen, Rebecca S. *Creating the Cold War University: the Transformation of Stanford*. Berkeley, CA: Univ. of California Press, 2010. 34
[24] Nielson, Donald L. *A Heritage of Innovation: SRIs First Half Century*. Menlo Park, CA: SRI International, 2006.
[25] Nielson, Donald L. *A Heritage of Innovation: SRIs First Half Century*. Menlo Park, CA: SRI International, 2006.
[26] Edwards, Paul N. *The Closed World: Computers and the Politics of Discourse in Cold War America*. New York: ACLS History E-Book Project, 2005.

of defense research at Stanford. In 1965, a Special Committee under the leadership of William Draper was formed to study basic policies regarding the SRI. The committee was given the task of "submitting recommendations on basic matters as University-SRI relationships, size and growth rate, government-industry ratio, research quality, finances, building program, international, and corporate organization."[27] Specifically, the financial relationship between the university and SRI led to the development of the "Associates Program of Stanford Research Institute", which allowed for selective invitations to work with the institute to be issued to few U.S companies, as long as the university was in agreement, and it was clear that "an Associate membership does not constitute a gift of support of the Education and research programs of Stanford University."[28] SRI was also directed that at least 75 percent of total research revenue should be from "projects in the so called "public interest", although the memo did not give specifics as to what these projects were.[29] The eventual definition of this relationship and the terms that came along with it allowed the SRI and Stanford to rapidly grow their reputation, building on the mobilization of the university.

By mid-1960s, the SRI had achieved a nation-wide reputation as a high-profile institution, ranking third among thinktanks and non-profit research groups.[30] The committee investigating the relationship between the university and the SRI eventually recommend that restrictions be placed on SRI's growth and suggested that Stanford be given a say in what contracts were accepted. Initially struggling to get the revenue necessary to pay the bills due to

[27] SRI Basic Policies, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[28] SRI Financial Relationship, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[29] SRI Size, Growth, and Government Industry Ratio, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[30] Leslie, Stuart W. *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: ACLS History E-Book Project, 2005. 243

lack of financial support from the university, the SRI had adopted a policy of taking DOD contracts, which accounted for 65 percent of the contracts taken on by SRI in 1965.[31] Among these were studies regarding alleged surveillance in Vietnam, counterinsurgency surveillance on Thailand, and the development of chemical weapons.[32] The SRI's reliance on defense funding to get off the ground reflects the how important the ability to gain these defense and federal contracts was, demonstrating the need for universities and institutions to adapt to the rapidly changing relationship between the military and the universities.

While the SRI operated independently from Stanford University, the institutions maintained close relations, both formally and informally. These included joint faculty appointments, shared research grants, joint teaching, shared funding for graduate students, a shared library, and the joint operation of a computer center.[33] Collaborative research had been conducted between the SRI and the Stanford Medical School for clinical applications of lasers, and SRI and the Food Research Institute at the university had also collaborated on farm marketing problems in Africa.[34] In his statement to the Stanford community, the President of the SRI, Charles Anderson, stated that "The institute's legal affiliation with Stanford University as expressed in the SRI charter is essentially a parent-subsidiary relationship…thus ultimate legal authority over the affairs of the institute resides in the Board of Trustees."[35]

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[31] Leslie, Stuart W. *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: ACLS History E-Book Project, 2005. 243

[32] Leslie, Stuart W. *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: ACLS History E-Book Project, 2005. 245

[33] President's Office-Relationship between Stanford and SRI, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

[34] SRI Charles Anderson Statement, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

[35] SRI Charles Anderson Statement, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

A close relationship with the federal government was a lesser matter of contention for the public universities that relied on federal funding. After WWII, however, an increased share of funding came from defense agencies. This can been seen at various universities across the country. At the University of California, Los Angeles (UCLA), a 1944 issue of *The Daily Bruin* reported that "this union of academic training and industry will aid greatly in post war expansion of the University which is expected to bring UCLA a college of engineering."[36] While not directly funded by the DOD, the establishment of such a college allowed UCLA to take advantage of research contracts through the DOD. The university, in its turn, trained engineers and physicists who could be mobilized quickly in case of new war.

The College of Engineering was an initial step in preparing UCLA to take advantage of new sources of DOD funded research. UCLA established the College of Engineering in 1944, although the major itself was not fully complete, and students were initially required to split their time evenly between the University of California Berkeley and UCLA.[37] The College of Engineering "Materialized the wide-spread plans for post war campus expansion."[38] Llewellyn M. K. Boelter, an engineer who previously worked at Berkeley as the Associate Dean of Engineering, was ultimately selected as dean of the new college. It was reported that "With the arrival of the new dean, pre-engineering curriculum already on this campus will be augmented with upper division courses in engineering science. Initial emphasis will be on the practical aspects of aeronautical engineering."[39] He planned to develop a unified engineering program instead of separate department specializations, although this would later prove to be an inefficient method of teaching, and specializations were restored to the curriculum.[40] By the end

[36] Anon., "Crowell Contributes to War Training Program" *Daily Bruin.*
[37] "History." Electrical Engineering. Accessed February 21, 2020. https://www.ee.ucla.edu/history/.
[38] Anon., "Boelter Appointed Dean of post-War Engineering School" *Daily Bruin*
[39]Anon., "Committee Considers Selection of Dean" *Daily Bruin*"
[40] Estrin, Gerald. "About." UCLA Samueli Materials Science and Engineering. Accessed February 21, 2020. https://www.cs.ucla.edu/history/.

of the decade, the College of Engineering had firmly established itself on the UCLA campus, strengthening UCLA's position to take advantage of the newly created military-industrial complex by creating departments that could take on research funded by the DOD.

Another new Californian university was established with close ties to the military – the University of California, Santa Barbara (UCSB). UCSB entered into the University of California system in 1944.[41] UCSB was initially a small liberal arts college located near to the Santa Barbara Mission. In 1954, the UC regents purchased a former Marine base in the city of Goleta twenty miles north from Santa Barbara. That base became the current location of the university.[42]

The city of Goleta changed dramatically during and immediately after WWII. The previously agricultural landscape became much more oriented towards military research and development, and the Goleta economy became much more oriented toward military weapons research.[43] This change started as early as WWII, with the establishment of Marine Corps Air Base near the Goleta slough, and became one of the key aspects of Goleta's future economy, attracting companies like GM Delco, a defense system research group.[44] The company "Aerophysics" in Goleta focused on creating guided missiles and other advanced weaponry and marked the genesis of the military industrial complex that would define the economy in Goleta. After Aerophysics was purchased by General Motors in 1960, a new wave of workers cemented the role of research and development in the local economy.[45] The changes to both Goleta , particularly in regards to its economy, and the changing path of UCSB contributed to the

[41] Wall text, University of California Special Collections, *Campus by the Sea*, Exhibit, UC Santa Barbara, CA.
[42] Original Deed for Goleta Property, University of California Special Collections, *Campus by the Sea Exhibit,* Santa Barbara, CA.
[43] Bondgraham, Darwin. "Goleta, the Bad Land." Sung a Lot of Songs. Accessed February 19, 2020. http://darwinbondgraham.blogspot.com/2008/08/goleta-bad-land-in-may-1960-i-joined.html. 14
[44] Bondgraham, Darwin. "Goleta, the Bad Land." Sung a Lot of Songs. Accessed February 19, 2020. http://darwinbondgraham.blogspot.com/2008/08/goleta-bad-land-in-may-1960-i-joined.html. 14
[45] Bondgraham, Darwin. "Goleta, the Bad Land." Sung a Lot of Songs. Accessed February 19, 2020. http://darwinbondgraham.blogspot.com/2008/08/goleta-bad-land-in-may-1960-i-joined.html. 22

establishment of UCSB's reputation as a research university attractive for defense research contractors.

Following UCSB's relocation to the former Marine Base in Goleta, the university grew dramatically in size. When UCSB admitted first students , many of the buildings were reused structures from the Marine base.[46] In 1956, Samuel Mosher, the founder of Sigma Oil and Gas, and Thomas Storke, the owner of the Santa Barbara News-Press and a former U.S Senator, were appointed to the governing board of the University of California. Over the course of the decade, they transformed the former liberal arts college into a university focused on science and research, all the while expanding the university campus, creating new departments and increasing enrollment.[47] Storke and Mosher took UCLA and Berkeley as a model, impressed by the work done by previous members of the governing board to boost federally funded weapons research, particularly John Frances Neylan, who played a vital role in boosting federal weapons research at Berkeley. The regents saw how a university campus had the potential to shape local economies, and shortly after the new Goleta campus opened, Research and Defense companies began to move to the area. With this vision, they moved towards creating a more "militarized" campus. The influx of companies working in R & D and the opening of the new UCSB campus created opportunities for federal research contractors.

Throughout the 1960s, UCSB's strategy of development remained the same. In 1962, a vice-chancellor at the University of California, Davis Vernon Cheadle , who chaired the botany

[46] Bondgraham, Darwin. "Goleta, the Bad Land." Sung a Lot of Songs. Accessed February 19, 2020. http://darwinbondgraham.blogspot.com/2008/08/goleta-bad-land-in-may-1960-i-joined.html. 16
Bondgraham, Darwin. "Goleta, the Bad Land." Sung a Lot of Songs. Accessed February 19, 2020. http://darwinbondgraham.blogspot.com/2008/08/goleta-bad-land-in-may-1960-i-joined.html. 14
[47] Bondgraham, Darwin. "Goleta, the Bad Land." Sung a Lot of Songs. Accessed February 19, 2020. http://darwinbondgraham.blogspot.com/2008/08/goleta-bad-land-in-may-1960-i-joined.html. 20

department at Davis beforehand, was offered a position as UCSB Chancellor.[48] [49] Under his leadership, UCSB became a research-based university much like UCLA, Berkeley and Davis, shifting away from its original liberal arts curriculum.[50] UCSB's transformation from a liberal arts college to a research university focused on sciences and engineering was a prerequisite for obtaining federal funding.

The opening of the School of Engineering at UCSB in 1961 further illustrates the growing trend of establishing new colleges of engineering to maximize potential for federal contracts. [51] UCSB recruited aggressively, making competitive offers to established scientists in the field of engineering. Albert G. Conrad, the head of the Department of Electrical Engineering at Yale was offered a position of the first dean and a professor at the new department.[52] He was followed by Philip F. Ordung, a professor of electrical engineering at Yale, who was also made chairman of the department and was entrusted with the development of the Department of Engineering.[53] In 1964, the Department of Engineering split into the Department of Electrical Engineering and the Department of Mechanical Engineering, and by 1966, the laboratory for electrical engineering was completed.[54] By then, UCSB's School of Engineering had grown to become a College of Engineering. Under Cheadle's leadership, UCSB became a university with

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[48] "Cheadle Receives Position as New UCSB Chancellor". *El Gaucho.* University of California Special Collections, *Campus by the Sea Exhibit,* Santa Barbara, CA. February 10, 2020.
[49] "Cheadle Receives Position as New UCSB Chancellor". *El Gaucho.* University of California Special Collections, *Campus by the Sea Exhibit,* Santa Barbara, CA. February 10, 2020.
[50]"Home Economics Closure". *El Gaucho.* University of California Special Collections, *Campus by the Sea,* Santa Barbara, CA. February 10, 2020.
[51] School of Engineering-Opening Announcement, University of California Special Collections, *Campus by the Sea Exhibit,* Santa Barbara, CA. February 10, 2020.
[52] Douglass, John, and Sally Thomas. "Santa Barbara Departments - E." University of California History Digital Archives. Accessed February 19, 2020. https://www.lib.berkeley.edu/uchistory/general_history/campuses/ucsb/departments_e.html#electrical_engineering
[53] Douglass, John, and Sally Thomas. "Santa Barbara Departments - E." University of California History Digital Archives. Accessed February 19, 2020. https://www.lib.berkeley.edu/uchistory/general_history/campuses/ucsb/departments_e.html#electrical_engineering
[54] Douglass, John, and Sally Thomas. "Santa Barbara Departments - E." University of California History Digital Archives. Accessed February 19, 2020. https://www.lib.berkeley.edu/uchistory/general_history/campuses/ucsb/departments_e.html#electrical_engineering

a national reputation in engineering. Computers became a key part of the growth of universities in the early sixties, making them much more competitive both in terms of programs and contracts that were offered. The establishment of a computer center at UCSB is one example of this feat.

At UCSB, the proposal for a Computer Center was part of the plans for UCSB's school of engineering from the very beginning. The proposal for a Computer Center was part of the original plans for the school of engineering. In 1961, a proposal for a computer facility at UCSB was presented by the Digital Computer Committee, a sub-committee within the Committee for Building and Campus Development.[55] Glen J. Culler, the Chairman of the committee, was a driving force behind the effort.

Before joining UCSB as an associate professor in the Department of Mathematics, Culler worked at Bunker Ramo, a manufacturer of military electronic devices, where he developed the Culler-Fried on-Line system, one of the first interactive computer systems. Under his leadership, the Digital Computer Committee developed first proposal for a Computer Center, which listed four major incentives for the center:

1. The Santa Barbara campus had to develop rapidly from a single undergraduate liberal arts college into a multi-unit campus and must achieve a high level of research competence.
2. The campus was still young and small enough to plan its future shape before size and increased complexity would mitigate against flexibility,
3. The administration was willing to support new approaches to education and research, including computers
4. Recent developments in computer technology promised a variety of new uses of the computer as a tool for research and education.[56]

The proposal stressed the research capabilities that a computer center would bring to campus, and anticipated that a computer laboratory "may well point the way for university computing

[55] Digital Computer Proposal, University of California, Santa Barbara, Computer Center. UArch 74. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[56] Digital Computer Proposal, University of California, Santa Barbara, Computer Center. UArch 74. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

centers of the future."[57] By building a Computer Center, the University would be able to take on more research projects, and expand their research capabilities. The development of the Department of Engineering, College of Engineering, and the Computer Center played an essential role in UCSB's growth as a university and reflected the goals of UCSB's new administration.

The ways in which these three universities were transformed during and in the immediate aftermath of WWII were very similar. Each, however, had its own unique story. The establishment of the SRI, engineering departments and colleges, and the increased emphasis on science and technology all reflect the desire to increase research and funding opportunities that was present both in California and across the country. There are, however, differences between Stanford, UCLA, and UCSB. While Stanford and UCLA were already well-established schools by the time these changes occurred, UCSB as it is known today was born out of the growing relationship between U.S universities and defense spending. This can be seen in the plans for the development of the college of engineering, which occurred on a relatively rapid time scale, and was designed to include a computer center specifically to make the school more competitive. Each of these universities provides a unique case study of the changes to U.S universities that occurred in response to World War II, showing how these schools adapted to take advantage of the rapidly growing relationship between the university and sources of federal funding.

[57] Digital Computer Proposal, University of California, Santa Barbara, Computer Center. UArch 74. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

II. ARPA and Lyndon Johnson's "Great Society"

By the time UCSB founded a computer center in mid-1960s, the country's priorities had changed. Lyndon Johnson's programs under the rubric of "Great Society," which included programs such as Medicare, were introduced in 1964. The Great Society was intended to address social problems that impacted the U.S., among them poverty, racism, political disenfranchisement, and urban decay.[58] While on the surface scientific and technological accomplishments had appeared to improve the lives of many U.S citizens, this newfound prosperity had not been distributed equally, with poverty and racism remaining major issues across the country.[59] The Great Society was intended to not only address ongoing unrest and economic instability in the U.S., but also improve the international reputation of the country.[60] Programs that specifically sought to improve the economic situation in the U.S were known as the "War on Poverty". Through a series of new programs, Johnson hoped to combat these issues. The shift in political priorities marked a significant shift in scientific priorities as well.

The invention of refrigerators and televisions showcased the supposed prosperity that scientific and technological advancements had brought to the American consumer. Johnson attempted to use these same social scientists to address social needs in the U.S.[61] Under the Johnson presidency, scientific priorities shifted from a focus on defense research to research with broader, social applications, combatting inequality and economic instability. These included increased scholarships from the National Science Foundation, in order to increase scientific

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[58] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 74
[59] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 75
[60] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 74
[61] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013.76

employment for post-war scientists.[62] The wide range of programs, which included forbidding job discrimination and increased federal welfare programs, addressed issues of healthcare, education, and early forms of environmental protection, such as the Clean Air Act of 1963.[63]

The Advanced Research Projects Agency (ARPA) and the ARPA Network project reflect this nationwide shift in scientific priorities. ARPA was founded in 1958, as a response to the Soviet launch of the first artificial satellite, Sputnik, as part of wider effort to ensure that the U.S. remained at the forefront of technological and scientific advancement.[64] The agency's goal was to keep the United States ahead of its rivals by funding research that would lead to significant advances in defense-related fields.[65] ARPA was initially rooted in defense research. One of the earlier projects that they took on was Project Defender, which worked to develop anti-missile technologies.[66] While ARPA was founded during the Eisenhower Administration and was defense-oriented, it changes its mission during Lyndon Johnson's presidency. Johnson advocated for the allocation of funds to universities to support basic research alongside research with direct ties to the military.[67] Many programs implemented during Johnson's "War on Poverty" were developed by scientists who had previously worked on defense projects, although the strategies that they had learned in defense labs were largely ineffective in solving issues like poverty and racism.[68] Following the national trend, ARPA's priorities has changed. The ARPA

[62] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 76
[63] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 83
[64] Sharon Weinberger, *The Imagineers of War: the Untold Story of DARPA, the Pentagon Agency That Changed the World*. (New York: Vintage Books, 2018)
[65] Janet Abbate, *Inventing the Internet*. (Charlesbourg, Québec: Braille Jymico Inc., 2003). 36
[66] Baucom, Donald R. "Eisenhower and Ballistic Missile Defense: The Formative Years, 1944-1962." *Air Power History* 51, no. 4 (2004).
[67] Janet Abbate, *Inventing the Internet*. (Charlesbourg, Québec: Braille Jymico Inc., 2003). 37
[68] Audra J Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 74

Network exemplifies this change, moving away from research with explicit defense applications and towards research with much broader and educational research.

In a response to this shift in priorities towards social development through science, federal agencies such as ARPA began to prioritize "basic research" and "dual-goal" research, that is, research with both military and civilian agendas. This is reflected in the projects that ARPA funded prior to the ARPA Network. Many of these early experimental projects and departments were crucial to the ARPA Network project. Among these was the Information Processing Techniques Office (IPTO) within ARPA in 196l. The IPTO was headed by Joseph Carl Robnett Licklider, an computer scientist who was later regarded by his peers as "the father of it all"[69] The IPTO began exploring information techniques and computer science at different universities, looking into the idea of building a basic network that could connect different research centers. By handing over control of larger scale defense projects, ARPA was able to focus their research projects on more exploratory sciences, allowing for the development of research projects outside those with traditional defense applications.

One of the projects reflecting this shift in ARPA's priorities was the exploration of ways to connect researchers across the country, to establish better ways to collaborate on a variety of projects. The first step taken in the establishment of the ARPA Network was the appointment of a new director for the Information Processing Techniques group (IPT). In 1965, Robert Taylor was appointed as Deputy Directory of the IPT group. Taylor had previously worked at the administrative headquarters for NASA, and had previously managed research projects related to computerized flight simulation research, display, and manned flight control systems.[70] Under his

[69] Waldrop, M. Mitchell. *The Dream Machine: J. C. R. Licklider and the Revolution That Made Computing Personal*. New York: Viking Penguin. p. 470.
[70] Robert Taylor Employee Records, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

leadership, the IPT began to look into developing a prototype on-line multiple access system for the Office of the Secretary of Defense.[71] In the ARPA release that was published to announce his hiring, ARPA stated that Taylor "is principally concerned with research, development and evaluation of new information processing techniques in the areas of computer graphics, languages, computer architecture, computer networks, pattern recognition, text manipulation, and information retrieval." [72] The purpose of the new system that Taylor planned to develop was to connect various research centers across the country to allow them to work collaboratively.

Even though a groundwork for the ARPA Network had been laid out, the project could not possibly proceed without infrastructure. In early 1968, Taylor presented a proposal for building such an infrastructure at a workshop at the National Systems of the Task Group on National Systems for Scientific and Technological Information. The proposal outlined a network of interactive computer systems communications. Tentatively called an ARPA network, it provided examples of a series of potential nodes connecting labs and universities like the Lincoln Laboratory at MIT, RAND Corporation, UCLA, UCSB, the Stanford Research Institute, Stanford, the University of Illinois, Bell Telephone Laboratory, Dartmouth, Systems Development Corporation, Washington University, the Pentagon, Carnegie Mellon University, and the University of Michigan.[73] At the end of this proposal, Taylor stated the ultimate goal of the project. With the network, he explained, "We hope to overcome the geographical barriers which prohibit the cooperative working together of people with common interests—be they students, scientists, soldiers, statesmen, or all of these."[74] Essential to this proposed network were

[71] Hiring Announcement, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[72] Hiring Announcement, Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[73] Plans for an Experimental, Interactive Computer Network, Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[74] Plans for an Experimental, Interactive Computer Network, Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

the Computer Science and Engineering Departments that had been established at universities across the country.

The proposal for ARPA Network reflected the emphasis that the Great Society placed on education by allowing more expansive collaboration between researchers. The proposal was approved by the director of ARPA, Charles Herzfeld in 1966. Robert Taylor recruited Lawrence Roberts from the MIT Lincoln Lab to direct what by then was referred to as the ARPA Network project. The Lincoln Lab already had an expertise on the construction of interactive graphics programs.[75] Roberts was an engineer by training, and while at MIT had already been working on communication networks. Assuming control of the ARPANET project, Roberts began to develop the actual plan for the ARPANET. One of the first steps of this process was the selection of the nodes of the network, influenced by ongoing research and personnel at each site.

Research that was underway at SRI was likely a reason for SRI's selection as one of the first nodes to come online.[76] Douglas Engelbart, an engineer who had worked at the SRI since 1957, made the SRI a perfect choice as one of the ARPANET nodes. Engelbart was the head of the Augmentation Research Center (ARC), which focused on ways to aid human problem solving through their relationship with a computer,[77] The ARC Lab was working on building an oN-Line System (NLS), and had previously received funding from NASA for his computer display technology.[78] After Roberts took charge of the project, he entrusted Engelbart with the development of human intellect augmentation techniques, to "increase the capability of man to approach a complex problem situation, to gain comprehension to suit his particular needs, and to

[75] ARPA Proposals- MIT, Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[76] I was unable to find any official documentation for the official selection of the nodes in the various archives that I visited. This is an educated guess.
[77] Augmenting Human Intellect: A Conceptual Framework. Douglas C. Engelbart, Summary Report, Stanford Research Institute, on Contract AF 49(638)-1024, October 1962
[78] "Douglas C. Engelbart." CHM. Accessed February 21, 2020. https://computerhistory.org/profile/doug-endelbart/.

derive solutions to problems."[79] Eventually his group would develop an on-line text editing system along with the creation of the mouse, along with many other basic computer functions, such as hypertext and the graphical user interface.[80] This work provide vital for not only the ARPA Network, but the future of computing.

Similarly to the SRI, earlier ARPA projects contracted at UCLA branched off into what eventually became UCLA's contribution to the ARPA Network project. In 1966, ARPA granted a contract to Professor Gerald Estrin, an engineer from the von Neumann Electronic Computer Project at the Institute for Advance Studies (IAS). He had previously worked on the Electronic Computer Project at the IAS, which was intended to be an electronic computing device to aid the war effort through assisting research efforts in various scientific fields.[8182]. The project would "concentrate on the characterization of information processing systems with particular emphasis on measurable behavior", along with "the objective of specifying the design of a geographically distributed network." [83] This contract laid the groundwork for the ARPA Network project at UCLA. Although it the network would not come online until 1969, the original research grant to Estrin established both the focus on network measurement and the initial concept of the ARPA Network. In March of 1968, in a progress report to ARPA regarding the Computer Instrumentation Research that was currently being conducted in the department, the Department of Engineering noted that "Our group, particularly L. Kleinrock and J. Stehura, is directly involved in the creation of the ARPA Network…describe preliminary efforts to specify a

[79] Augmenting Human Intellect: A Conceptual Framework. Douglas C. Engelbart, Summary Report, Stanford Research Institute, on Contract AF 49(638)-1024, October 1962
[80] "Bibliography - Doug Engelbart." Doug Engelbart - Doug Engelbart Institute. Accessed February 28, 2020. https://www.dougengelbart.org/content/view/163/124/.
[81] Estrin, Gerald. "About." UCLA Samueli Materials Science and Engineering. Accessed February 21, 2020. https://www.cs.ucla.edu/history/.
[82] "Electronic Computer Project." Institute for Advanced Study. Accessed February 21, 2020. https://www.ias.edu/electronic-computer-project.
[83] Proposed Amendment to ARPA Contract, Leonard Kleinrock Papers (Collection 2773). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.

network control language and prepare a queuing analysis of the ARPA net."[84] In the final technical report written by Estrin, he notes "The work done under this contract led to the new, presently active, ARPA contract DAHC-15-69-C-0285 under the Principle Investigatorship of Professor Leonard Kleinrock. The new ARPA contract now has a firm primary mission to implement the ARPA Network and continue any necessary supporting work on modelling and measurement of the network."[85] With the initial ARPA funded work at UCLA regarding Computer Instrumentation concluded in 1969, it branched off into the contract for the ARPA Network, which became one of the primary ARPA contracts for the department at the time.

The group working at UCLA focused mainly on testing the performance of the ARPA Network. Headed by Leonard Kleinrock, the Network Measurement Center (NMC) became the primary ARPA contract related to the network. UCLA was granted the project by Lawrence Roberts, the head of the ARPA Network Project. Roberts had previously worked with Kleinrock at MIT, and was aware of his previous research on queuing theory, a way to analyze network systems.[86] Kleinrock's group's role was to create theoretical models of the network, and analyze how it performed.[87] UCLA's overall role in the project was described in *The Daily Bruin*: "The group will play a key role as the official network measurement center, analyzing computer interaction and networking behavior, comparing performances against anticipated results and keeping a continuous check on the network's effectiveness."[88] In an ARPA Quarterly Management Report, it was stated that "the goal of this project is to create an environment suitable for computer research activities in the understanding and in the development of methods

[84] ARPA Progress report 1968, Leonard Kleinrock Papers (Collection 2773). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.
[85] ARPA technical report draft, Leonard Kleinrock Papers (Collection 2773). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.
[86] Abbate, Janet. *Inventing the Internet*. Charlesbourg, Québec: Braille Jymico Inc., 2003. 58
[87] Abbate, Janet. *Inventing the Internet*. Charlesbourg, Québec: Braille Jymico Inc., 2003. 58
[88] "Country's computers linked here first" *Daily Bruin.*

for information processing…This includes modelling time-shared systems, memory hierarchical systems, and the ARPA experimental computer network."[89] As this center was essential for the overall performance of the network, it was the first node to be installed.

The node at UCLA was the first that was brought online due to the role it played in monitoring the network. In a report produced by Bold Beranek and Newman, the company responsible for manufacturing the physical nodes, it was stated: "Host sites be prepared for IMP deliveries as follows: 1. UCLA- 1 September 1969." [90] Additional nodes would be added a month at a time, beginning with Stanford, UCSB, and the University of Utah. These nodes would form the initial ARPA Network. The NMC specified what measurement tools were to be implemented in the Interface Message Processor (IMP), a node with packet-switching capabilities, and the measurement tools had the ability to be "used selectively at the various network nodes under program control. Upon request, they collect data regarding their node, summarize these data in special measurement messaged, and then send these messages to a collection HOST (normally UCLA-NMC). We have, therefore, developed at CULA-NMC the capability for control, collection, and analysis of the data messages."[91] Kleinrock had insisted on the importance of building measurement software into the network in the initial stages of the project so that its performance could be measured.[92] In order for work on the network to begin as quickly as possible, UCLA was selected as the location for the first node of the network as it played a vital role in tracking the overall performance and capabilities of the ARPA network.[93]

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[89] Quarterly Report, June 30, 1970, Leonard Kleinrock Papers (Collection 2773). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.
[90] IMP ARPA Report 1, Leonard Kleinrock Papers (Collection 2773). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.
[91] National Computer Conference, 1974, Leonard Kleinrock Papers (Collection 2773). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.
[92] Janet Abbate, *Inventing the Internet*. Charlesbourg, Québec: Braille Jymico Inc., 2003. 56
[93] Janet Abbate, *Inventing the Internet*. Charlesbourg, Québec: Braille Jymico Inc., 2003. 58

As with the other two universities, the crucial expertise in place at UCSB and the high-powered machinery on campus made UCSB a key component of the ARPANET. The node at UCSB was the third node to come online following UCLA and SRI, followed by the University of Utah. Glen Culler's on-line system played a vital role in UCSB's selection as one of the first ARPA Network nodes in 1968. According to a student newspaper, "Culler was chosen as a recipient of the $300,000 ARPA contract for two main reasons. First, he was at that time one of the leading men in the field of computer technology…Secondly, because of the development of the Culler-Fried "on-line" system, and growing computer needs, UCSB had purchased an IBM 360/75 computer which is a relatively large and high-powered machine."[94] All this made UCSB an attractive choice as an ARPA Network node.

The establishment of the Computer Center at UCSB as part of its Department of Engineering provided a base for research that would later prove important to the ARPA Network. The Computer Center was opened in 1964, headed by Glen J. Culler who was appointed the head of the Center. Culler's early experiments with interactive computer systems made UCSB a logical choice for one of the starting ARPA Network nodes. At his previous position at Bunker-Ramo, he developed the Culler-Fried Online System, one of the first interactive computer systems.[95][96] In 1966, the on-line system was used by Harvard, who used the Computer Center to solve calculus and statistics problems from a math class.[97] An announcement in 1966 stated: "using a technique called on-line computation, developed by Dr. Glen J. Culler, Director of the UCSB Computer Center, and Dr. Burton D. Fried, Professor of Physics at UCLA, a

[94] "The ARPA Network: Computers for war or peace?" *El Gaucho.* May 15, 1970.
[95] "Biography." IEEE Computer Society Glen J Culler Comments. Accessed February 19, 2020. https://www.computer.org/profiles/glen-culler.
[96] *Digital Computer Newsletter*. Vol. 18. 1966. 22.
[97] Anon., "Computer Communicates: Math Problems link UCSB, East" *El Gaucho.*

time-sharing system eventually will link various other universities throughout the country to the computer via a network of telephone lines."[98]

This early done by Culler provided the groundwork for UCSB's contribution to the ARPA Network. Culler left UCSB in 1969 to form his own company, Culler-Harrison, which later became a connection on the ARPA Network. After his departure, the UCSB node of the ARPA Network focused on a variety of tasks. David Harris, an Assistant Professor of Chemistry, took over the ARPA contract. Under Harris, what became the Experimental Communications Laboratory focused on "Graphics for mathematics, Investigate spoken speech, Interactive computing for educational use, I/O techniques for low-cost consoles." One of the tasks at hand was to "create a new computer facility having characteristics of the Culler On-Line System and general processing capability" and to "provide hardware and software support in ARPA network development."[99] The node at UCSB built on the work previously done by Culler, and it would eventually be implemented across the campus.

The ARPANET was initially run by the military and was funded by the Department of Defense. Yet, as Taylor pitched it, he did not talk about military applications explicitly, emphasizing its potential for a wide spectrum of applications. As he put it in the proposal, "ARPA supports research in a number of fields, only one of which is information processing. Information processing research as supported by ARPA can also be characterized as computer systems research and it is only this relatively small portion of the total ARPA effort that is directly concerned with the so-called ARPA Network." [100] As presented in a copy of the original proposal kept in Taylor's personal papers, the proposal was primarily focused on educational and

[98] *Digital Computer Newsletter*. Vol. 18. 1966. 22.
[99] ARPA Proposal Experimental Communications Laboratory. Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[100] ARPA Initial Proposal, Stanford University, Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

collaborative work enabled by such a network system. Yet, the proposal also mentioned the potential for future military applications, although no specific examples are given in the report.[101]

While the hybrid -- military and civilian -- nature of ARPA Network was implicit in its design, the implementation of the project was different at the first three nodes. While each node of the ARPA Network was selected based on prior work and availability of qualified personnel on campus, the actual use of the network on these campuses varied across the three locations. A at UCSB, the ARPANET was actively used on campus for the education of students, while at the SRI and UCLA the network was used only by those who worked on the project. Following the initial success of the ARPANET, the node at SRI remained relatively closed off from the student body and public, serving largely as an information hub for users of the ARPANET, bringing the ARPANET's educational role into question.[102] The node at SRI served primarily as a resource for those who were already connected to the network, providing user guides and ways to connect those who used the network for research. While the use of the ARPANET at UCLA was still largely limited to those involved with the ARPANET project, the involvement of graduate students in the project tied more closely to the "educational" role of the network.

Unlike the SRI and UCLA, the node at UCSB was geared toward education and instructional needs. For instance, the project was used in the Math department as a "system used in teaching courses at UCSB." In September of 1969, The team reported that the "Culler On-Line System [was] now running in IBM 360/75 in full time-sharing mode and servicing 40 on-campus and 3 off-campus graphical consoles ("Teleputers")."[103] Manufactured by Culler's former employer Bunker-Ramo, the Teleputer System could "generate complex displays while

[101] Plans for an Experimental, Interactive Computer Network, Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[102] SRI ARPA Proposal, Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[103]ARPA Proposal Experimental Communications Laboratory. Robert W. Taylor papers (M2281). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

transmitting a minimum amount of information…The initial applications of Teleputer are in the performance of 'classical' mathematical computations."[104]This educational application of the Teleputers would be used to connect to classes taught at Harvard, and complete mathematical equations in real-time.

By December 1969, the ARPA Network was online, with the first message having been successfully transmitted from UCLA to the SRI. This technological milestone, however, coincided with larger cultural changes that put this success into a different political context.

[104] G *Digital Computer Newsletter*. Vol. 18. 1966. 22.

III. Student Protests on Three Different Campuses

In the early- to mid-1960s, Lyndon Johnson's Great Society, with its effort to turn defense-funded science and technologies to solve social problems, seem to point towards a bright future for American society led by its science and scientists. By the end of the decade, however, the attitude has changed. Finding scientific fixes to societal problems proved difficult to implement in practice, reflected in the failure of social science to overcome racial discrimination and end economic inequality.[105] In addition, changing attitudes towards the Vietnam War also led to a change of attitude towards science and scientists.[106] U.S involvement in Vietnam raised questions surrounding the difficulties supporting or participating in ongoing scientific research related to the Vietnam War while opposing the war and military actions.[107]This in turn raised further questions about the role that defense spending played on university campuses.

Growing disillusionment towards U.S involvement in the Vietnam War led to larger cultural shifts that happened across the country.[108] On university campuses, students began to protest the presence of the military-industrial complex in the university. As the U.S involvement in the Vietnam War became more and more problematic and the war became deeply unpopular, students protests against the war grew into a political movement.[109] Questions about the role of the university in the Vietnam War sparked protests across the country, calling into question the value that the universities placed on their growth and tight symbiosis with federal and defense sponsors of science.

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[105] Audra J Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 80
[106] Audra J Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 75
[107] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013.105
[108] Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013.88
[109] Kelly Moore, *Disrupting Science: Social Movements, American Scientists, and the Politics of the Military, 1945-1975*. Princeton: Princeton University Press, 2014. 133

The three universities that served as nodes for ARPA Network were also the nodes of the student activist networks. Students for a Democratic Society (SDS) was one such network., Launched in 1960 at the University of Michigan in response to U.S involvement in the Vietnam War, SDS became one of the primary student activist groups in the country. SDS had branches at campuses across the U.S. As protests escalated throughout 1967 and 1968, the SDS continued to tackle the issue of recruitment on campus, while also beginning larger protests against the draft and military contractors. Branches of the SDS were present on all three of the initial ARPA Network campuses. The SDS branches at UCLA and Stanford were especially active.

While Stanford, UCLA and UCSB had the same technology -- the ARPA Network – in common, the technology played different roles in local student protests. The different reactions of students at these three sites provide a vantage point from which to examine student activism in the tumultuous years of 1968-9.

Student Protests at Stanford and the SRI

The SRI became a primary target of student activism at Stanford in 1967, when the SDS and another student group, The Experiment, announced tentative plans for a "mobilization week" in protest of SRI's alleged involvement in the Vietnam war.[110] Ira Arlook, the coordinator of The Experiment, stated in the Stanford Daily that "Students and faculty will hold "vigils" during class breaks from April 5-8, displaying posters accusing University administration, trustees, and SRI of complicity in an immoral war."[111] The group offered the example of FMC Corporation, a manufacturer of lethal gas and other strategic defense materials, who had three Stanford trustees and three directors of the SRI on its board.[112] Marching both on campus and towards the SRI,

[110] "Pickets to Aim at SRI", *The Stanford Daily,* 6 April 1967
[111] "Pickets to Aim at SRI", *The Stanford Daily,* 6 April 1967
[112] "SRI Protestors Get Protests and Denial", *The Stanford Daily,* 14 April 1967

many student activists called for an end to the trustees, and by extension Stanford's, apparent involvement in the war, and expressed their desire for the war to end overall.[113] The development of chemical and biological weapons at SRI was denied by Homer Meaders, the manager of public relations for SRI, although the debate surrounding SRI would continue throughout Stanford's anti-war movement.[114]

Tensions between the SDS activists and the SRI board of directors came to a head in 1968. The SDS issued a deadline of October 14th for SRI to stop all war-connected projects, stating that the "University is coming close to this position and we see no reason why SRI cannot do the same."[115] The SDS made a series of demands: "All contracts, both classified and unclassified be made public, complete with information on the value of the contracts and the individuals performing the work, Stanford and SRI trustees make public all their corporate and governmental connections, Stanford faculty make public all their governmental and corporate contracts and connects." SDS gave SRI a week to respond to or comply with these requests.[116]After this deadline was seemingly ignored by the SRI board, Anderson replied to a letter sent by the president of the student body, David Hayes, and stated "To accede to your request that we make no commitments to research involving selected areas of national security would be inconsistent with this policy, and thus I must advise that we cannot comply with it."[117] In his official response to the demands of SDS Anderson stated "Some of this research is sponsored by the U.S. Government and such is in the public interest. SRI will continue its contract research in accordance with policies established by its Board of Directors…Therefore,

[113]"SRI Protestors Get Protests and Denial", *The Stanford Daily,* 14 April 1967
[114] "SRI Protestors Get Protests and Denial", *The Stanford Daily,* 14 April 1967
[115] "An Editorial", *The Stanford Daily,* 21 October 1968
[116] SDS Demands, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[117] Anderson Letter to Hayes, Dec 1968, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

the SDS demands made public on October 8 must be rejected."[118] Initially attempts by the SDS to stop classified research at SRI were unsuccessful, and would later fuel the more aggressive tactics adopted by the group the next year.

The universities' relationship with the SRI became a major issue in 1969. A press release from the Stanford University News Service cited a survey conducted by a student-faculty committee headed by Professor Nathan Maccoby regarding research activity at SRI and the concerns about its activities. The results from the survey state that "Comparatively few senior university staff members and alumni leaders share Stanford student and faculty concerns for restraining certain kinds of research at Stanford University."[119] However, surveys of both students and faculty indicated that the majority of student and faculty interviewees favored restrictions on the research at the SRI, specifically in regards to chemical, biological, and radiological warfare research.[120] Most students and faculty favored integration of the SRI into the university, with a committee to control exactly what research was conducted while staff and alumni preferred that the university sell the SRI for the maximum profit.[121]

The student activists at SDS continued to push for the SRI to cease all war-related research, eventually beginning a month-long protest due to the lack of response regarding defense spending from the administration or the SRI. The SDS continued making this demand of both the campus and the SRI, culminating on April 3, 1969, with the creation of the April 3rd

[118] Statement of Charles A Anderson in response to SDS demands, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[119] Bob Beyers- Stanford University News Service, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[120] Bob Beyers- Stanford University News Service, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[121] Bob Beyers- Stanford University News Service, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

Movement (A3M).[122] A3M arose in response to the lack of action from both SRI and Stanford regarding research committed by both institutions. In the agenda for the community meeting on April 3rd that gave the movement its name, the group discussed a variety of options regarding how to determine what research to encourage or discourage, and based discussions on the SRI becoming a "positive and creative force in society" around the demand that "the trustees discontinue all plans for the severance of SRI from the university (with or without a restrictive covenant), and that instead SRI be brought under tighter control by the university."[123] Reacting to the administration's failure to stop SRI from conducting what was perceived to be war research, the movement took over the Applied Electronics Laboratory (AEL), who received nearly two million dollars in funding from the DOD.[124]

The controversy surrounding the SRI at Stanford University reflects the growing unease with the "hybrid" institutions. The president of Stanford, Kenneth Pitzer, received several suggestions on how to resolve the situation with students and the SRI, with one letter from Bridger Mitchell, an assistant professor of Economics, writing "I suggest that real gains in communication and understanding will likely flow from inviting members of the student press to attend meetings of the faculty and of administration and trustee bodies. Their presence at these deliberative meetings will, I believe, move us closer to the reconstruction of mutual confidence in a reasoning community, a goal which we must pursue with urgency and determination." [125] A letter written to the president of the board of trustees, William Palmer Fuller, however, refuted

[122] A3M Press Release, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[123] SRI Coalition Agenda, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[124] Stuart W Leslie, *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: ACLS History E-Book Project, 2005.

[125] Letter from Bridger Mitchell to Kenneth Pitzer, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Box 9. Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

the idea that the Stanford community is a place where communication could successfully occur. He suggested, "we can construct a better framework for SRI than the present one. I don't think what we will come up with is likely to be popular with those who would have us take precipitate action in the face of the abovementioned responsibilities and principals."[126]

While the A3M movement achieved its goal to end war-research on campus, the protest continued. The A3M movement reached its peak halfway on April 18th, when over eight thousand members of the community gathered to commend the movement and call for a "Day of Concern", when classes would be cancelled.[127] Threatening another sit in at AEL, the Dean of the Engineering school, Joseph Petitt, announced that the school of engineering would no longer accept classified research.[128] In a letter from a "concerned employee" of SRI to Anderson, the employee wrote "I can see no reason for severance. None of the reasons given seem adequate. The fact is, we are guilty of doing the research that outrages the moral sense of the students."[129] Despite the lack of support from both the Stanford Community and some SRI staff, in May it was announced that Stanford would fully divest from SRI, bringing an end to over a month of continuous student activism.

There is no evidence that the ARPA Network project was directly targeted by student activists on Stanford's campus, nor have I found much information that the ARPA Network was widely known about by the student body at the time it was being developed. It is my belief that these two facts go hand in hand; as there was seemingly no widespread information about the

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[126] R.C. McCurdy Letter, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
[127] Stuart W Leslie, *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: ACLS History E-Book Project, 2005. 245
[128] Stuart W. Leslie, *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: ACLS History E-Book Project, 2005. 246
[129] SRI Staff Member speaks out against severance, Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.

ARPA Network on campus, there is no reason for it to have been directly targeted. In addition, even if students were aware of research for the ARPA Network was being conducted, the fact that research was being conducted at the SRI that had direct connections to military efforts in Vietnam would have made it a much less important target. It is my opinion that all of these factors combined prevented the ARPA Network from being a target of student activists on campus.

While student protests at Stanford focused on the SRI and its relationship to both the university and defense spending, protests at UCLA had a much more general nature, instead focusing on various facets of the anti-war movement.

Student Activism at UCLA

Like many college campuses throughout the sixties and seventies, UCLA had several active student groups that organized various anti-war activities and events. Among these were the Bruin Young Democrats, The Coalition, The Resistance, and branches of the Students for a Democratic Society (SDS) and the Vietnam Day Committee (VDC). VDC had strong connections with SDS. Both groups raised big questions about the different forms that the anti-war movement took on. *The Daily Bruin*, for instance, stressed: "The anti-war movement here during the past year has evolved into a phenomenon encompassing broader issues and reflecting a greater plurality of backgrounds."[130] While both the SDS and VDC "engaged in a series of organized protests in an attempt to galvanize anti-Vietnam sentiment and generally disturb "the functions of the establishment"", anti-war activism on campus also focused on several specific areas on campus and nationally.[131] These included the military-industrial complex, the draft, the Reserve Officers'

[130] "War, draft spark politically active year". *The Daily Bruin.* May 29, 1968
[131] "War, draft spark politically active year". *The Daily Bruin.* May 29, 1968

Training Corps (ROTC) program on campus, and culminated with participation in a series of Moratorium Days, which were held across the nation. Each of these areas were targeted throughout the anti-war movement at UCLA.

Similarly to Stanford, at UCLA a local think tank became the first target of attacks. At UCLA, it was the Rand Corporation. RAND was founded in 1948 in order to assist the U.S. military with wartime research.[132] Born out of the ties between industry and the military, many students found this association undesirable. At the time, RAND had a reputation of being "a sort of 'enabler' of a military in pursuit of destructive operations in Vietnam," often supporting the policies of the administration, which were heavily opposed by students on campus and across the country.[133] While UCLA did not have a direct tie to an outside institution like the SRI, the RAND Corporation did have some ties to the campus. In 1969, student activists began to call for UCLA's relationship with Rand to be examined further. An article in *The Daily Bruin* by a member of the International Socialists stated that "the institutional relationship between the University and RAND Corp., one of America's top think-tanks for the development of imperialist strategy" was a major issue that must soon be addressed.[134] Comparing RAND to the Stanford Research Institute, the article cited a study conducted by the UCLA Task Force which "proved unquestionably that a good number of UCLA professors and part-time researchers have been involved on a regular basis in military and intelligence research at RAND while holding jobs at UCLA."[135] The International Socialists called for a "demonstration at the RAND headquarter as part of the national student anti-war action", and further called for the university

[132] Audra J Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013. 28
[133] Mai Elliott, and James A. Thomson. *RAND in Southeast Asia: A History of the Vietnam War Era*. RAND Corporation, 2010. Accessed March 22, 2020. vii
[134] "The University's cozy relationship with Rand". *The Daily Bruin.* Oct 23, 1969
[135] "The University's cozy relationship with Rand". *The Daily Bruin.* Oct 23, 1969

to sever ties with RAND.[136] When RAND and the CIA were scheduled to recruit at UCLA during two days of student protests in November, The Coalition also called for action at the Placement Center, and a "boycott of classes on those days so that these issues may be discussed."[137] The collaboration between UCLA and RAND reflects the close ties between the university and the DOD.

Beginning in 1966, students at UCLA protested the presence of Dow Chemicals on the UCLA campus, as they were strongly against the presence of those involved in the production of weapons on campus. As a manufacturer of napalm, a key ingredient in incendiary bombs and flamethrowers, students were strongly against attempts by Dow to recruit graduate students, raising the question of whether "certain corporations which some student organizations consider involved with war crimes in Vietnam should be allowed to recruit on campus. By allowing these corporations to use student-financed university facilities, these organizations feel the university, and indirectly, the students, are implicated with the war crimes".[138][139] Student opposition to Dow recruitment presented itself in a variety of ways: "Last year such feelings motivated a protest outside the Placement Center, and later a sit-in in opposition to Dow Chemical Company's recruitment on campus."[140] In response to this, the board of directors of the Alumni Association adopted a resolution that "condemned[ing] acts of coercion and vandalism…which interfere with the orderly conduct of the business of the University."[141] This resistance to Dow marks an early protest against the war effort on university campuses.

In 1968, students once again protested recruitment on campus, this time specifically targeting the military draft. The Campus Mobilization Committee (CMC) planned a rally at the Career

[136] "The University's cozy relationship with Rand". *The Daily Bruin.* Oct 23, 1969
[137] "RAND, CIA Recruiting on M-Day". *The Daily Bruin.* Nov 11, 1969
[138] "Students and the military-industrial complex". *The Daily Bruin.* Dec 1st, 1967
[139] "SLC Considers referendum issues, Placement Center policy". *The Daily Bruin.* Nov 2nd, 1967
[140] "SLC Considers referendum issues, Placement Center policy". *The Daily Bruin.* Nov 2nd, 1967
[141] "Campus disorder opposed by Alumni Assn. Board". *The Daily Bruin.* Jan 8, 1968

Planning and Placement Center to "protest campus recruiting by the Marine Corps."[142] Intending to allow students to hear both sides of the story by setting up a similar recruiting table for the CMC, Peer Vinther, a member of the steering committee, argued that he "does not agree that recruiting falls under the blanket label of free speech."[143] A joint movement consisting of the CMC, Peace and Freedom, Robin Hood Slate, and Aware Students of Rafferty, who were just some of the groups active on the campus, the rally against marine corps recruitment reflects the collaborative efforts seen across UCLA's campus.

While anti-ROTC protests initially made up a large portion of anti-war activism, protests at UCLA shifted focus to target recruitment from military organizations and companies involved in defense related research. While UCLA did not have a direct institute to target the way Stanford students had targeted the SRI, they attacked potential links with RAND, and companies that aided the war effort. In 1968, *The Daily Bruin noted*: "Rather than centering their attention on ROTC, organizations like Students for a Democratic Society (SDS) have focused on outside recruiters, especially those from Dow Chemical C., and to a lesser extent, on military research on universities."[144] The presence of the ROTC on campus, did, however tie in to protests against war-related activities on campus. While they were not directly targeted by student groups at this time, "there has been one development this year that could…prove more of a problem for ROTC than being the prime target of SDS. It is the movement to deny academic credit for ROTC courses."[145] This shift in focus can be observed through the other targets taken on by SDS and other student groups on campus, although the issue surrounding the ROTC appeared to linger in the minds of activists. One of these key issues, alongside the issue of academic credit, was "is a

[142] "Mobilization' plans rally to protest Marine Corps recruitment on campus". *The Daily Bruin.* Oct 16, 1968
[143] "Mobilization' plans rally to protest Marine Corps recruitment on campus". *The Daily Bruin.* Oct 16, 1968
[144] "Anti-ROTC crusaders largely quiet this year". *The Daily Bruin.* March 28, 1968
[145] "Anti-ROTC crusaders largely quiet this year". *The Daily Bruin.* March 28, 1968

college campus an appropriate place to conduct military training."[146] These shifts reflect the changing priorities on UCLA's campus, and the similarities and differences between student activists on each campus,

Further reflecting UCLA's participation in national movements, student activists on campus planned to participate in a national moratorium to protest the war. The rally was "nationally sponsored by the Vietnam Moratorium Committee, headquartered in Washington D.C, is the beginning of a series of escalating anti-war actions planned for the nest three months in an "attempt to maximize public pressure to end the war by encouraging the greatest number of Americans to peacefully express their opposition."[147] As with many anti-war activities at UCLA, the moratorium was supported by a variety of student groups, among them the Bruin Young Democrats and the Resistance.[148] This moratorium paved the way for additional moratorium days that would be held on campus and across the country, which were planned so "citizens can devote time and energy to the important work of taking the issue of peace in Vietnam to the larger community."[149]

The moratorium held in November expanded on the rally held in October. In November, "Viet Nam Moratorium activities in the UCLA campus include a two-day boycott of classes, Thursday and Friday, the 13th and 14th. Each month one day is added to the boycott of work and classes until the war is ended."[150] While "The boycott of classes, called in conjunction with the Moratorium, appeared to be only moderately successful", the moratorium appeared to have been much more successful in placed like San Francisco.[151] The moratorium featured a variety of speakers representing different groups on campus, including the National Association of Black

[146] "Mandatory ROTC questioned". *The Daily Bruin.* April 1, 1968
[147] "Rally slated for moratorium". *The Daily Bruin. Oct* 13, 1969
[148] "Rally slated for moratorium". *The Daily Bruin. Oct* 13, 1969
[149] "Rally slated for moratorium". *The Daily Bruin. Oct* 13, 1969
[150] "Moratorium activities planned". *The Daily Bruin. Nov* 7, 19699
[151] "M-Day Lowy key here, but not in SF". *The Daily Bruin. 1969*

Students.[152] Most departments noted that there was not a significant drop in attendance, although it was somewhat noticeable.

Unlike anti-war protests at Stanford, UCLA did not focus on a specific institute like the SRI. While the role that Rand Corporation played in the war effort was comparable to the role SRI played, Rand was not directly attached to UCLA, and was not under the control of the university. UCLA's connections to Rand were a target of student activists, as were many other companies directly involved with the military-industrial complex such as Dow Chemicals. While student activism at Stanford provides insight into one specific issue, activism at UCLA paints a much broader picture of the anti-war movements occurring across the country. With the variety of different anti-war groups working on campus, ranging from the SDS to the VDC, UCLA targeted a number of different issues that combined to create their overall movement. While UCLA students did not directly challenge defense spending on campus, they did target the military-industrial complex like activists at Stanford.

While the ARPA Network and ARPA funding on campus were not directly attacked like there were at other campuses such as UCSB, at UCSB it was precisely the ARPA Network that became one of the most visible focal points of student protests.

UCSB and the North Hall's Takeover

Throughout the early sixties, UCSB had a reputation of a campus with a largely politically conservative reputation. This would change by the end of the decade, as a result of UCSB students' response to Vietnam war and their activism for other causes.[153] One of the most

[152] "M-Day Lowy key here, but not in SF". *The Daily Bruin. 1969*
[153] Wall text, University of California Special Collections, *Campus by the Sea*, Santa Barbara, CA.

notable acts of student activism on the UCSB campus in the late sixties was the takeover of North Hall, the home of the Computer Center, by the Black Student Union (BSU).

Early in the morning on October 14th, 1968, twelve members of the BSU entered North Hall, removed the employees from the Computer Center, and "threatened immediate damage to computer instrumentation and irreplaceable files of electronically recorded data if efforts were made by the University or civil authority were made to remove them."[154] The students made a series of demands, one of which, the firing of the head football coach, Jack Curtice for racist behavior, was immediately rejected. The other demands were more programmatic. These included "drastic action to enroll more black students, engage more blacks for the faculty, the athletic department, the counseling and administrative staff, and the establishment of a college for black studies."[155] After nine and a half hours, the students left the building when they were granted seven of the eight demands, leaving the Computer Center undamaged.[156]Administrative officials were allowed to enter North Hall, and the "Dean of Students Lyle G. Reynolds said later that by keeping law enforcement officers out "We saved $30 million worth of computer equipment.""[157]

In his statement regarding the seizure of the Computer Center following a meeting with the students on October 22nd, UCSB Chancellor Vernon Cheadle gave his own version of the reason why the students seized North Hall. He stated:

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[154] Chancellor Vernon Cheadle's Statement Concerning the Seizure of North Hall, Box 1, Articles 1970. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

[155] Reagan and Cheadle on UCSB, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

[156] Black Students Win Demands on UC Santa Barbara Campus: 30 Million in Equipment Spared, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

[157] UCSB students granted Seven of eight demands, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

> If you talk with blacks at length you learn of the deep feeling of resentment at the treatment of their race and other minority races. I do not need to document the treatment. The numbers of blacks in the universities and colleges in our state and in others are just one reflection of it…The most active blacks strikeout, if they can, at what they consider racism, a difficult term to define for it is used to conjure up all manner of discrimination, real or even imagined, direct or indirect, conscious or not, of one race or another. It is apparently in this context of thinking that the blacks occupied a part of North Hall.[158]

While Cheadle noted that the actions of the students did warrant the suspension of the activists, he ultimately decided to forgo it, as the students left the Computer Center before any damage was done and before Cheadle had to take any official disciplinary action.[159] Following his meeting with the students, Cheadle made his official position on the events that had happened clear: "It is my firm resolve to maintain on this campus conditions that assure reason and persuasion as against coercion and intimidation in the work of this University."[160]

Reaction to the North Hall Takeover and the way that is was handled by the Administration was mixed. While Charles Hubbell, an assistant professor in the Department of Sociology at UCSB, noted the courage of the activists, he also argued that "the disruptive occupation of a university building is unacceptable. I am confident that this view is shared by the majority of our campus community."[161] Representatives from the student body, however, were much more supportive of the black students' choice of action. In a statement, the president of the Associated Students stressed: "We sympathize with the grievances posed by the Black Students at U.C.S.B. We firmly believe that the actions of Monday can have positive benefits for the

[158] Chancellor Vernon Cheadle's Statement Concerning the Seizure of North Hall, Box 1, Articles 1970. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[159] Office of the Chancellor. Oct. 14, 1968, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[160] Office of the Chancellor. Oct. 14, 1968, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[161] "Irresponsibility Mars Audacity of Black Student Takeover at UCSB", Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

entire University community…We recognize the importance of the events and support the understanding reached between the Blacks and the Chancellor."[162] In a resolution passed by the Academic Senate, the Senate agreed to work with a newly established Commission on Racial Problems, while also noting "whereas there can be no question that the October 14th occupation of North Hall by the Black Student's Union was beyond the limits of legal protest, the Academic Senate of the University of California also recognizes that this was a symbolic action, designed to enforce upon the consciousness of the entire community the legitimate outrage felt by the Black Students at those aspects of racism and injustice in our society that appear, however subtly, in the University of California."[163]

The Academic Senate had a good reason to strike a reconciliatory note. By then, the seizure of the computer center by student protesters made headlines. Ronald Reagan, then the governor of California, used the situation to threaten a crackdown on the University of California system as a whole. As he put it, "I've had a bellyful; I think we've all had a bellyful of this…A tiny faction of students are causing all this disturbance. I intend to see that guidelines are set down…There is going to be an end to this."[164]

It was, of course, not accidental that the student activists choose the Computer Center as they site of protest and action. The value of the Computer Center was highlighted in articles related to the North Hall Takeover. For instance, one article written five months after the takeover noted: "Perhaps most important is choice of the computer center as a target. A recent

[162] A.S Body Statement, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[163] Academic Senate Resolution, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[164] Reagan Threatens Crackdown on UC, Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

poster which has been sold on campus has a picture of the occupiers sitting in front of an open bank of computers with the simple title, 'Man vs. Computer.'"[165] The value that the university placed on the Computer Center, and the significant investment that it represented made it an excellent choice for the protestors to threaten. The importance of computer centers to the growth of universities in the late sixties and early seventies, which allowed for a much wider variety of research projects to be completed with both defense industries and local businesses, was a vital factor in the resolution of the North Hall Takeover.[166] By targeting a site that was vital to both the operations of UCSB and its future, the BSU ensured that their demands were heard, and effected some change on the campus. At the time, the Computer Center was responsible for a number of basic administration tasks at UCSB, including enrolling in classes and the distributions of grades.[167]

The North Hall Takeover was not the only time that the Computer Center became the target of activists on the UCSB campus. The protests against defense spending and war research ravaged at UCSB as it did at many universities across the country. A report submitted in May 1970 stated that "There is no research on the Santa Barbara campus of the University of California that is either classified for purposed or national security of whose 'specific purpose is the development of means to destroy life or incapacitate human beings,' according to Dr. Robert O. Collins, acting vice chancellor for research and graduate affairs."[168]

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[165] "Computers Remain Symbols Long After North Hall Event", Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[166] Carroll Pursell, "Grand scheme of computer center", 31 October 1972, Office of Public Information. UCSB Special Collections. Subject Files. Box 17. Computer Center 1970-1987
[167] "Computers Remain Symbols Long After North Hall Event", Box 5, North Hall Incident. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[168] "Report Submitted: No War-Related Research at UCSB", Box 7, Classified Research on Campus. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.

Some professors joined the students and organized as well. In 1967, Charles Spaulding, a professor in the Department of Sociology, set up a Committee on War-Related Activities and Classified Research.[169] Between 1968 and 1970, the committee was conducting investigations and urging the administration to remove classified research from campus. They succeeded to get two resolutions adopted by the Academic Senate. The first read: "under normal circumstances classified research ought not to be allowed on this campus." The second stated that "the Campus should not support research, the specific purpose of which is to develop means of destroying life or incapacitating human beings."[170] Even this success was modest, however, since the resolution did not exclude all Department of Defense research. The ARPA Network is the case in point.

When the controversy over other ARPA projects erupted on other campuses, there were several reasons for the protesters to target the ARPA Network. In the words of a student reporter for *The Daily Nexus*,: "One reason, of course, is that ARPA is an arm of the Defense Department…Another Reason is the Department of Defenses' redirection of its funds toward more "mission-oriented" studies and its simultaneous withdrawal of funds from "basic" research…More important, however, is the direction which many studies funded by ARPA have taken."[171] This included counterinsurgency research at various institutions, such as the University of Michigan and the General Research Corporation.[172]

There was another issue with the ARPA Network and defense spending on campus, however. The funding often did not come directly from the DOD, the fact that the protesters saw with suspicion and hostility. One such controversy surrounding the Computer Center arose in

[169] "War-Related Research at UCSB", Box 7, Classified Research on Campus. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[170] "War-Related Research at UCSB", Box 7, Classified Research on Campus. University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Department of Special Collections, Davidson Library, University of California, Santa Barbara.
[171] "The ARPA Network: Computers for war or peace?". *El Gaucho. May* 15, 1970.
[172]"The ARPA Network: Computers for war or peace?". *El Gaucho. May* 15, 1970..

1972. The research and development company Delco Electronics paid to use the Computer Center instead of paying for their own computer system, helping UCSB keep the center running.[173] The article in *El Gaucho* which detailed the involvement of Delco raised the question "Do we want a war-related research firm funding a University facility? Is the philosophical role of a University congruent with that of a company like Delco?"[174] The university's relationship with Delco became a subject of special investigation. In 1974, the newspaper reported that "Delco has been proficed office space within the Computer Center, and along with the office, a set of keys that provide access not only to their office but to the computer facilities as well. This practice is rare even when the user is part of the University."[175]

This complicated relationship between the university, industry, and the DOD would continue to be discussed by the university and students throughout the seventies, with classified and war-related research technically banned on campus. While UCSB did not have an outside institute like SRI or Rand for professors to accept defense contracts through, the example of Delco shows how tightly linked the university, industry, and the DOD were, and the inevitable work around the banning of specific research.

[173] David Handler, "GM's Delco Electronics is paying for a quarter of UCSB's Computer Center. Should defense-oriented firms be so closely connected to a University? And who decides?", 1972, Office of Public Information. UCSB Special Collections. Subject Files. Box 17. Computer Center 1970-1987"
[174] David Handler, "GM's Delco Electronics is paying for a quarter of UCSB's Computer Center. Should defense-oriented firms be so closely connected to a University? And who decides?", 1972, Office of Public Information. UCSB Special Collections. Subject Files. Box 17. Computer Center 1970-1987"
[175] Alfred Mandel, "Defense research in our Computer Center", 25 May 1973, Office of Public Information. UCSB Special Collections. Subject Files. Box 17. Computer Center 1970-1987

Conclusion

The legacy of the ARPA Network is more complex than it may initially appear. With ARPA weathering the switch from defense centric research to basic research in the sixties, the ARPA Network walks a fine line between education, basic research, and defense research. This can be seen through the three campuses examined in this paper.

Before the idea of the ARPA Network was even conceived, the universities in California that went on to enable to success of the project were born out of a changing relationship between defense spending and the universities. Embracing sources of federal funding allowed universities across California to build up their reputations, establishing new departments and colleges of engineering and other scientific fields in order to make themselves as competitive as possible for research contracts. While at UCLA and UCSB this resulted in significant investment in said departments, and at UCSB the establishment of an advanced computer center, Stanford created an entirely new institute, the SRI. This rapid development further linked the universities with these new sources of funding, creating a new military-industrial complex with a lasting legacy. While, as many of its founders may argue, the ARPA Network was not a defense project, the institutions that made it possible were inescapably tied to these defense contracts.

However, by the time the ARPA Network project was official proposed, a significant change in scientific priorities had occurred. Lyndon Johnson's "Great Society" moved away from defense spending and invested more in basic research, aiming to improve society with the same scientific methods that had previously been used for defense research. The ARPA Network, with its stated experimental and educational goal falls into this basic research category, as does much of the network related research that was already ongoing at the universities that were ultimately selected as nodes. With Douglas Engelbart already working at the ARC Lab in the SRI on human

computer relations, Leonard Kleinrock working at UCLA on queuing theory and network measurement, and Glen Culler at UCSB having developed an on-line system, the groundwork for the ARPA Network was well established at these schools. This made their selection as the first nodes a logical choice.

While the educational goal of the ARPA Network initially separated it from different defense sponsored projects of the time, it's actual educational use across the three campuses varied. While at UCSB the ARPA Network was implemented on the campus and was used in teaching undergraduates, at SRI the ARPA Network remained closed to everyone who was not on the network. UCLA found the middle ground, involving graduate students in the project but not the general student body. While the ARPA Network fulfilled its experimental purpose, its educational goal can be called into question with its varied implementations across the three campuses.

As the 1960s progressed, the role of defense spending on university campuses was scrutinized much more heavily, due in part to both the failings of the Great Society to use science to make significant social change, and increased U.S involvement in Vietnam. Student activists across the country rose up in protest, and the ARPA Network nodes were not exempt from this. The presence of the ARPA Network on campuses was only directly questioned at UCSB. Student concerns over defense research on campus and potential defense applications of the network caused both the network and the computer center it was housed in to become a point of contention on campus. While the ARPA Network was not directly targeted at Stanford, perhaps because it was relatively unknown to the campus at the time, the SRI's acceptance of defense research caused it to become a target for protestors, indirectly involving the ARPA Network in this backlash. At UCLA, activists did not target the ARPA Network or a specific organization,

instead taking a broader approach to their protests. At all three campuses, a key issue was the presence of defense research at universities, which students felt made them complicit in the war. As the ARPA Network was funded by ARPA under the Department of Defense, it fell into this category despite its stated educational purpose.

These three campuses and the ARPA Network project provide insight into a period when the universities relationship with defense spending underwent massive changes, going from a mutually beneficial relationship to one that was much more controversial, especially amongst the student body. Each node provides a lens through which to see the rapid growth of a university thanks to defense spending, its role in the ARPA Network, and the backlash to the very thing that built up the modern university. These schools, projects, and activists did not end the relationship between the department of defense and the university. The ARPA Network serves as an example of attempts to navigate this changing relationship, walking the fine line between education and defense research. While the network was successful, serving as a precursor to the internet as we know it today, the reliance on defense spending and constantly shifting scientific priorities are an important part of its legacy, making it another piece of the complicated legacy of the military-industrial complex.

Bibliography

Archives :

Daily Nexus Online Archive, https://www.alexandria.ucsb.edu/catalog?f%5Bseries_name_sim%5D%5B%5D=Daily+nexus

El Gaucho Online Archive, https://www.alexandria.ucsb.edu/catalog?f%5Bseries_name_sim%5D%5B%5D=El+Gaucho

Leonard Kleinrock Papers (Collection 2773). UCLA Archives and Special Collections, Charles E. Young Research Library, University of California, Los Angeles.

Michael Allen Wingfield Papers (Collection 2327). UCLA Archives and Special Collections, Charles E. Young Research Library, University of California, Los Angeles.

Robert W. Taylor Papers (M2281). Special Collections and University Archives, Stanford University, Stanford, Calif.

Stanford University, President's Office, Sterling-Pitzer Transitional Records (SC0217). Special Collections and University Archives, Stanford University, Stanford, Calif.

The Daily Bruin Online Archive, http://archive.org

The Stanford Daily Online Archives, https://archives.stanforddaily.com/

UCSB Daily Nexus Online Archive, https://www.alexandria.ucsb.edu/catalog?f%5Bseries_name_sim%5D%5B%5D=UCSB+daily+nexus

University of California, Santa Barbara, Computer Center collection. UArch 74. Archives and Special Collections, University of California, Santa Barbara.

University of California, Santa Barbara, Office of Public Information subject files. UArch 12. Archives and Special Collections, University of California, Santa Barbara.

University of California, Santa Barbara, Public Information Office, Isla Vista / Student Unrest Subject Files. UArch 36. Archives and Special Collections, Davidson Library, University of California, Santa Barbara.

Secondary Sources:

"Biography." IEEE Computer Society Glen J Culler Comments. Accessed February 19, 2020. https://www.computer.org/profiles/glen-culler.

"Electronic Computer Project." Institute for Advanced Study. Accessed February 21, 2020. https://www.ias.edu/electronic-computer-project.

Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America*. Baltimore: Johns Hopkins University Press, 2013

Donald R. Baucom "Eisenhower and Ballistic Missile Defense: The Formative Years, 1944-1962." *Air Power History* 51, no. 4 (2004).

Darwin Bondgraham, "Goleta, the Bad Land." Sung a Lot of Songs. Accessed February 19, 2020. http://darwinbondgraham.blogspot.com/2008/08/goleta-bad-land-in-may-1960-i-joined.html.

John Douglass and Sally Thomas. "Santa Barbara Departments - E." University of California History Digital Archives. Accessed February 19, 2020.

Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America*. New York: ACLS History E-Book Project, 2005.

Gerald Estrin, “About.” UCLA Samueli Materials Science and Engineering. Accessed February 21, 2020. https://www.cs.ucla.edu/history/.

Janet Abbate, *Inventing the Internet*. (Charlesbourg, Québec: Braille Jymico Inc., 2003)

Leslie, Stuart W. *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: ACLS History E-Book Project, 2005.

Mai Elliott, and James A. Thomson. *RAND in Southeast Asia: A History of the Vietnam War Era*. RAND Corporation, 2010. Accessed March 22, 2020. www.jstor.org/stable/10.7249/cp564rc.

Mitchell M. Waldrop. The Dream Machine: J. C. R. Licklider and the Revolution That Made Computing Personal. New York: Viking Penguin

Nielson, Donald L. *A Heritage of Innovation: SRIs First Half Century*. Menlo Park, CA: SRI International, 2006.

Peter J. Westwick, *Blue Sky Metropolis: the Aerospace Century in Southern California*. (Berkeley, CA: University of California Press and Huntington Library, San Marino, California, 2017)

Rebecca S. Lowen, *Creating the Cold War University: the Transformation of Stanford*. (Berkeley, CA: Univ. of California Press, 2010)

Sharon Weinberger, *The Imagineers of War: the Untold Story of DARPA, the Pentagon Agency That Changed the World*. (New York: Vintage Books, 2018)

“Douglas C. Engelbart.” CHM. Accessed February 21, 2020. https://computerhistory.org/profile/doug-endelbart/.

"History." Electrical Engineering. Accessed February 21, 2020. https://www.ee.ucla.edu/history/.