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What happens when universities partner with weapons labs? Implications of the University of Michigan/Los Alamos computing facility

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EXECUTIVE SUMMARY

In 2024, the University of Michigan and Los Alamos National Laboratories (LANL) announced a partnership to build a $1.25 billion high-performance research computing facility. While U-M leadership asserts that the facility will lead to advances in medicine, cleaner energy, and climate science, the history of similar partnerships since World War II shows that they pose grave intellectual, institutional, and ethical challenges. The partnership's impact on the future of U-M's research and teaching missions, and its impact on the community where it will be sited, demands a transparent, university-wide deliberation, involving faculty, student, staff, and community stakeholders, as well as experts on the governance of research and higher education, to determine whether it is aligned with or in conflict with U-M's research, teaching, and public responsibilities.

KEY FINDINGS

Partnership implicates U-M research in nuclear weapons research: National security agencies have long funded academic research that appears unrelated to weapons development because they expect it to one day inform their security missions. The partnership ties U-M to the U.S. nuclear weapons program even though researchers may also engage in computational research aimed at non-security problems.

Partnership will militarize scientific computing and allied research fields at U-M: National security agency funding changes the direction of research fields by encouraging researchers to align their research questions with funding opportunities. The partnership will encourage researchers—including students—to pursue questions relevant to LANL's nuclear weapons stewardship responsibilities. It will thus reorient scientific computing and allied fields away from non-military areas of scientific interest.

Partnership threatens knowledge dissemination and scientific collaboration: U-M and LANL officials have confirmed that the facility will predominantly be used for classified nuclear weapons research. The partnership will require increased security classification, decreasing knowledge sharing and opportunities for collaboration with other institutions and scholars, including international collaboration.

Partnership subordinates public benefit to weapons research: Advocates claim that the partnership will produce public benefits like clean energy and pharmaceutical technologies. But tying such benefits to a weapons research program treats public benefit as a "spinoff," subordinate to weapons research.

Facility is misaligned with the university's purpose: Largely classified, highly militarized research facilities have historically been controversial because they conflict with the traditional purposes of higher education: advancing knowledge through curiosity-driven, publicly

beneficial, and shareable research, and training new generations of scholars in that pursuit. This misalignment led U.S. universities, including U-M, to sever their ties to such facilities decades ago.

Recommendations: The partnership's impact on the future of U-M's research and teaching missions, and its impact on the community where it will be sited, demands a transparent, university-wide fact-finding mission and binding deliberation, involving faculty, student, staff, and community stakeholders, as well as experts on the governance of research and higher education, on whether it is aligned with or in conflict with U-M's research, teaching, and public responsibilities.

BACKGROUND

In 2024, the University of Michigan and Los Alamos National Laboratories (LANL) announced a partnership to build a $1.25 billion high-performance research computing facility. The university plans to locate the facility in Ypsilanti Township, not on U-M's campus.[1] It will be composed of two separate computer centers. One, consisting of 85% of the facility's planned square footage, will be devoted to LANL researchers. University of Michigan researchers will have access to the other center, projected to be 50,000 square feet, 15% of the total facility footprint.[2]

LANL is one of 17 national laboratories operated by the Department of Energy (DoE), the government agency whose responsibilities include managing the U.S. nuclear arsenal.[3] National laboratories are government-funded research facilities where government scientists study problems of national importance related to nuclear weapons and cleaner energy technologies. The national lab system was created to perform work thought to be too applied or long-term for university researchers and too far upstream of development for industrial and commercial labs. LANL is operated by the National Nuclear Security Administration, a semi-autonomous DoE office, and is tasked with ensuring

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"the effectiveness of America's nuclear deterrent through nuclear weapons design, certification, and component manufacturing."[4] LANL's remit includes maintaining and modernizing the U.S. nuclear weapons stockpile.[5]

U-M and LANL leadership explain that their new facility will use high-performance computing —"running sophisticated algorithms across thousands of processors"—to study highly complex systems with many thousands of variables.[6] With a voluntary ban on live weapons testing, LANL researchers at the lab's New Mexico facility use high-performance computing to study the resilience, safety, and reliability of the nuclear stockpile. LANL officials confirm that their portion of the facility will be predominantly used for research related to the U.S. stockpile.[7]

U-M officials have offered broad and vague descriptions of the research that the university's part of the facility may conduct. Pointing to the fact that the technologies that model nuclear detonations can also be applied to studying medicine, climate, and energy systems, they explain that the facility will "provide researchers with the computing capacity to solve the world's most complex challenges." They suggest that the facility's research may "improve brain cancer surgery outcomes, accelerate drug discovery, and predict extreme weather events."[8] How many U-M researchers and students will have access to the facility, what exactly they will study, and what role their research will play in LANL's nuclear weapons research is presently unclear.

The partnership appears very beneficial for LANL. The New Mexico facility is running out of the physical space and environmental resources—in particular water—required for high-performance computing. Despite the much smaller footprint allocated to U-M, the university is responsible for securing $850 million—70% of total project funding—through a combination of direct contributions and university-facilitated financing. LANL will contribute $300 million. For context, U-M itself invested $699 million dollars for all university research in fiscal year 2025; its entire research enterprise—including government, philanthropic, and industry funding—totaled $2.16 billion.[9] In other words, U-M support for LANL will dwarf its investment in all other research conducted at the university. Hoping that the center will benefit the state economically and reputationally, the Michigan legislature has granted $100 million from the state's Strategic Site Readiness Program Grant fund.[10]

The partnership has triggered strong opposition among some government officials and community members. U.S. Rep. Debbie Dingell, officials in nearby Ypsilanti Township, and community members have pressed the university for details about the facility's purpose and its connection to new nuclear weapons technologies. Community members are concerned about the location of the facility, its similarity to commercial data centers whose construction and operation are controversial throughout Michigan, and U-M's ability to build the facility without community consent. They also worry that by supporting research into nuclear weapons, the facility is implicated in the U.S. nuclear weapons program.[11]

U-M and LANL officials seek to differentiate their facility from commercial data centers by stressing its focus on high-performance research computing. And they argue that because the facility is devoted to research, not weapons manufacturing, it is immune from moral concerns about its connection to nuclear weapons' development. They accuse the project's critics of "flooding local conversations with sensational claims" about its nuclear ties.[12]

However, even if they are not making weapons, LANL officials have confirmed that their facility will be used for related research.[13] Scientists and engineers in security-relevant fields—from the nuclear sciences and engineering to chemistry, biology, and beyond—have wrestled since at least World War II with the dual nature of their research: it can benefit humanity, but it also produces the capacity for violence at broad scales.[14] Thus, this facility raises complex ethical questions about when research crosses the line from beneficence or neutrality to public harm.

Although the proposed project is not a commercial data center and will not manufacture nuclear weapons itself, it raises a number of serious concerns. Foremost among them: Is U-M's sponsorship and management of a facility that will be dominated by classified nuclear weapons research aligned with the core missions of higher education: advancing scientific inquiry, disseminating knowledge, training the next generation of scholars, and serving the public? What are the intellectual and institutional consequences of tying high-performance computing research at U-M to a federal laboratory whose primary task is the stockpile, stewardship, and modernization of nuclear weapons?

In other words, U-M support for LANL will dwarf its investment in all other research conducted at the university.

The University of Michigan is not the first institution to address these questions. Beginning in the 1940s, American universities took on large government contracts directly related to U.S. national security. In fact, the University of Michigan maintained an off-campus facility devoted largely to classified national security research during that time. Named the Willow Run Laboratories (WRL), it sparked a 25-year debate over the consequences of tying an academic institution to a facility that contributed little to its teaching or research missions. The history of WRL and of university-national security partnerships since World War II more broadly offers important insights into the U-M/LANL partnership and facility.

What is LANL?

Los Alamos National Laboratory (LANL) was created during World War II on 60,000 acres of land in New Mexico. It was a key site in the Manhattan Project to design and build the world's first atomic bomb.[15] After World War II, LANL became a national laboratory that was managed by the Atomic Energy Commission (AEC), the agency created in 1946 to advance U.S. nuclear weapons and nuclear energy design and development. In 1977, the newly created Department of Energy (DoE) took on the AEC's responsibilities, including managing LANL.[16] Today, LANL is operated by the National Nuclear Security Administration, a semiautonomous office of the DoE. NNSA's mission includes maintaining and modernizing the U.S. nuclear weapons stockpile.[17]

LANL's researchers played a crucial role in the creation of the thermonuclear bomb, first tested in 1952. They have conducted research relevant to the nuclear sciences, including studying the black holes and developing radioisotopes used in medical research and cancer treatments. LANL's work diversified away from nuclear weapons after the end of the Cold War, as world leaders hoped that the end of superpower conflict would also lead to global nuclear disarmament.

After years of dramatic global reductions in nuclear stockpiles, in 2010, the Obama administration tasked the DoE with modernizing the nation's nuclear arsenal. This project, which has continued through subsequent administrations, is expected to take around 30 years and cost a minimum of $1.7 billion. Modernization includes increasing the production of fissionable plutonium, assessing the longevity of the nation's existing stockpile of an estimated 3700 working nuclear warheads, and designing a new generation of nuclear weapons. Additionally, the U.S. stockpile includes around 1500 retired warheads slated for dismantlement.[18] The White House's DoE budget request for FY 2027 includes a 12% increase in NNSA's budget and a notable decrease in funding for clean energy and other civilian DoE research.[19]

Is U-M's sponsorship and management of a facility that will be dominated by classified nuclear weapons research aligned with the core missions of higher education: advancing scientific inquiry, disseminating knowledge, training the next generation of scholars, and serving the public? What are the intellectual and institutional consequences of tying high-performance computing research at U-M to a federal laboratory whose primary task is the stockpile, stewardship, and modernization of nuclear weapons?

Lessons from U-M's Cold War Classified Research: The Willow Run Laboratories

This partnership is not the first time that U-M has hosted a large national security research facility. The history of a prior controversial facility, the Willow Run Laboratories (WRL), offers insights into the challenges posed by the U-M/LANL partnership.

WRL grew out of U-M's World War II research. During the war, the university held over thirty classified contracts. Researchers developed radar jamming technologies, new weapons, and novel processes to manufacture RDX, the world's most powerful explosive until the atomic bomb was detonated in 1945.[20]

U-M wartime research was conducted by faculty in their campus labs. After the war, the University sought to continue performing national security-sponsored research, but to do so in a way that maintained a separation between classified, military-focused work and the traditional business of academic research and student training.

A Classified Weapons Research Facility Dependent on Government Funds

The university created WRL to provide that separation. Established in 1946, the research facility was located at Willow Run airport, about fifteen miles from downtown Ann Arbor. During World War II, Ford Motor Company built thousands of B-24 bombers at Willow Run; it was the world's largest factory at the time. The federal government sold the facility to U-M for $1 on the understanding that the university would use it to conduct military contract research dedicated to postwar security concerns. The transfer turned the bomber facility into a largely classified facility that was owned and operated by the university but dedicated exclusively to performing defense research.[21] About half of WRL's employees—between 300–400 in the labs' early years—held PhDs in mechanical, aeronautical, and electrical engineering and the physical sciences. To complete the facility's separation from campus, they were not allowed to join the U-M faculty.[22]

Willow Run Laboratories hosted multi-year, multimillion-dollar research contracts with the Air Force, Army, Navy, and other defense sponsors, the bulk of it classified. Its research funding dwarfed federally sponsored research held by U-M faculty and performed on campus. The facility included a computer laboratory, a radar laboratory, an infrared laboratory, as well as flight testing and human factors facilities. The laboratories' portfolios included research on acoustics and seismics, data processing technologies, aerial platform navigation, and radar and infrared surveillance.[23]

WRL's research produced important military technologies. It was instrumental in the development of the heat-seeking BOMARC missile, anti-ballistic missiles, and a variety of military reconnaissance and surveillance technologies—optical, acoustic, and infrared systems for detecting human targets on traditional battlefields and in natural landscapes, like jungles and caves. [24]

Other U.S. universities ran semiautonomous national security research institutes as national security concerns fueled tight intellectual and institutional ties between science, technology, and the military. Some, like CalTech's Jet Propulsion Laboratory and Johns Hopkins Applied Physics Lab, were sponsored by a single agency. Others, like MIT's Instrumentation Laboratory, Stanford's Microwave Laboratory, and WRL contracted with multiple military agencies.[25]

These institutions were more like federal laboratories than academic research units. So why were they operated by universities? Semi-autonomous, university-administered, federally-sponsored research labs emerged during the Cold War as a way for the federal government to draw researchers into research relevant to the military while maintaining the appearance of intellectual independence from government missions. University contract laboratories' arms-length relationship made it easier to attract researchers wary of losing their intellectual autonomy. Scientists also viewed university-administered sponsored research labs as more prestigious places of employment than government laboratories.[26]

At the same time, because sites like WRL relied on a steady stream of agency funding for their survival, they were more responsive to government needs, including for research classification, than traditional university faculty were.[27] As one of the architects of this arrangement, Atomic Energy Commission physicist Henry Smyth boasted, semi-autonomous, university-sponsored labs gave the federal government "secrecy, and big groups of scientists who will take orders."[28] Universities justified the arrangement by arguing that the facilities gave them access to unprecedented amounts of funding, classified knowledge, and expensive equipment, which in turn allowed them to attract staff and gain intellectual prestige.[29]

The U-M/LANL partnership shares important characteristics with WRL. Like WRL, the proposed facility will be miles away from campus and largely staffed by researchers beholden to government needs rather than advancing and disseminating curiosity-driven scientific research. Willow Run was even explored as a possible location for the new facility.[30] Like WRL, the new facility's finances dwarf the campus research enterprise. And like WRL, the new facility focuses predominantly on classified national security research that will be walled off from U-M. In fact, the new facility is likely to be subject to less university oversight than WRL was. WRL was governed by a committee of university officials with the appropriate security clearances to review its research contracts and products; U-M officials admit that the university will most likely not know what is being done in LANL's computing center. [31]

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An Institution in Conflict with the University's Purpose

WRL triggered controversy because its largely classified, highly militarized research mission was in tension with the traditional purposes of higher education: advancing knowledge through curiosity-driven, publicly beneficial, and shareable research and training new generations of scholars in that pursuit.[32]

That tension dogged WRL from the start. In 1949, its director lamented that the facility did not contribute to the university's educational mission. Faculty had no interest in its highly applied weapons research. The labs' physical and intellectual separation from the university, and the fact that researchers were beholden to government sponsors' demands, led to low morale and high turnover.[33]

In the 1950s, U-M leaders tasked an advisory committee composed exclusively of science and engineering faculty with assessing the labs' status. The committee's deliberation produced important questions:

- "Should the University consider undertaking projects in which a large part of the effort may concern topics which would not ordinarily be considered for research by the University faculty?"
- Should it "engage in research for the purpose of developing facilities?"
- Should it "engage in research that will attract technical and scientific skills" even though they will not be used in instruction?
- And if it did do so, how could it be appropriately managed?[34]

The committee reported that after ruminating on these questions, they were unable to "agree on any basic justification" for U-M's involvement in the labs' highly applied weapons research.[35] WRL was misaligned with U-M's purpose as a research university. They briefly considered severing the university's ties to WRL but concluded that Defense funding was too good to give up. The BOMARC contract was worth $9 million in 1956 ($112 million today).[36] One of WRL's biggest contracts, code-named Project Michigan and devoted to combat surveillance technologies, was worth $9 million in 1959 alone; by 1963, it generated $28 million in contract funds (over $305 million today).[37]

Instead of ending its oversight of WRL, the committee recommended that the university build ties between U-M faculty and the facility. U-M offered joint appointments to a few members of the WRL staff. And it allotted $250,000, about 5%, from Project Michigan's contract, to a "Teaching Faculty Research Program" that offered grants to U-M faculty for "basic research in fields having possible applications to combat surveillance."[38] Faculty from math, physics, electrical engineering, chemical engineering, and aeronautical engineering received grants to advance theories of turbulence, devise new

materials for microwave devices and semi-conductors, and identify new low-noise radar detection techniques. Researchers in psychology, philosophy, and psychiatry also received funding. At first glance, support for those disciplines might seem disconnected from combat surveillance. But WRL's oversight committee explained that the research proposals addressed problems "closely related to human operator overload systems frequently encountered in surveillance data handling and to advanced computer design."[39]

The comparative largesse of defense funding encouraged scholars to portray their research as militarily relevant. Project Michigan's faculty grants inspired psychologists and psychiatrists to reframe their laboratory research on human cognition and motivation, performance under stress, and group problem-solving dynamics in terms of combat surveillance systems. Likewise, U-M philosophers reworked their theories of logic to fit Project Michigan's remit.[40] As the next section explains in more detail, this is a common way in which national security funding reorients research—even basic, curiosity-driven inquiry—toward funders' needs. This practice was so common that Defense patrons had a name for it; they called it "painting projects blue."[41]

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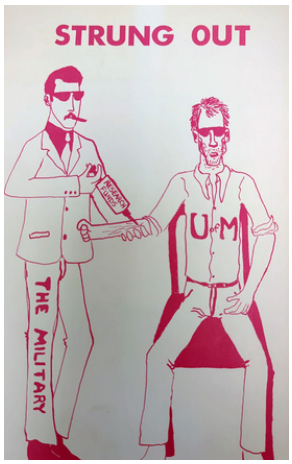
Tensions between WRL and the university continued to simmer in the 1950s and 1960s. When WRL staff and U-M faculty and students questioned why the university was running a classified contract research facility off campus, WRL's defenders mobilized rhetoric common among universities that sponsored large defense research projects. They argued that the university had an "inferred obligation" to the public to solve national security problems. They argued it was better that an academic institution, rather than a profit-hungry industrial firm, do the work.[42] They insisted that classified research contracts gave U-M access to the "forefront of technology." They warned that if U-M, which ranked fifth nationally among universities for Defense contracts and 64th among all U.S. Defense contractors, did not "play the game" of classified government research, it would fall behind other institutions.[43] And they argued that without their research, the nation would fall behind its adversaries.[44]

Today, U-M/LANL partnership advocates make similar arguments to justify their project. They argue that the university's current computational capacity is too limited to "fully realize our public mission."[45] They assert that the partnership will establish the university as "a national leader in advanced computing and scientific research."[46] They explain that bringing "the biggest, baddest, fastest computer in the world" to U-M is what Los Alamos must do "to protect our citizens here in the United States."[47]

Similar rhetorical strategies failed to convince members of the U-M community who worried that WRL was fundamentally at odds with the university's research, educational, and public responsibilities. In 1965, continued frustration among the faculty began what would become a five-year investigation into the ethics of U-M's substantial classified research portfolio, most of it conducted at WRL. At the same time, WRL leaders continued to warn university leadership that the gulf between the laboratories and campus impeded the recruitment of highly qualified staff, which reduced the quality of the laboratories' research and harmed its reputation with its federal sponsors.[48]

U-M Research Directly Implicated in Violence

These events coincided with the U.S. war in Vietnam, which dramatically increased scientific and public concern about the outsized presence of national security money on university campuses across the United States. In Washington, Congressional officials warned that the "military-academic-industrial complex" was militarizing scholarship and fueling a bloody and unpopular war. At universities across the country, students and faculty examined the ways military-sponsored research, regardless of whether it was basic or applied, abetted the war. In Ann Arbor, student activists depicted the university as "strung out," addicted to military research funds, in political cartoons.

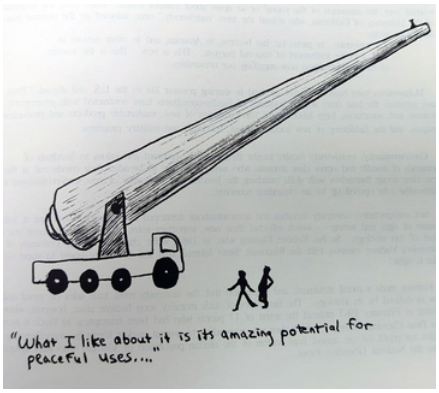


Students for a Democratic Society, "Strung Out," 1970.

Aware that public opposition to research funded by the military threatened their ability to create closer ties to the university, WRL staff tried to draw a distinction between the lab bench and the military battlefield. One WRL lab director told the Michigan Daily, "What the defense department does with their work is their business, we just go ahead and develop more technology."[49] But WRL research was directly implicated in the Vietnam War. WRL experts in acoustics and seismics developed the electronic warfare and counterinsurgency technologies that the United States used to detect "guerrilla intruders" in Vietnam. And WRL staff did not simply toil at the bench. They traveled to Vietnam and Thailand to assist the armed forces in counterinsurgency and reconnaissance operations on the ground.[50]

University leaders tried another approach: mobilizing the blurry line between civilian and military research. Just as advocates of the U-M/LANL facility invoke advances in brain science and cancer research to mitigate concerns about its security ties, so did WRL's defenders. U-M President Harlan Hatcher told the public that a $10 million Defense Department contract to design and build an observatory for tracking ballistic missiles innocently studied "space vehicles in flight."[51]

This was the inverse of painting projects blue. It was also such an obvious fabrication that it was a running joke at Willow Run. WRL researchers told the Daily, "one of our favorite jokes is to talk about the non-military uses of the new observatory in Hawaii. Publicly the officials talk about peaceful uses of the observatory. But everyone knows it's there for tracking ICBMs."[52]



Students for a Democratic Society, "Strung Out," 1970.

By 1968, U-M faculty and student governments were fed up. To rein in WRL, the Faculty Senate and the Regents approved new rules for sponsored research. They stipulated that U-M would "not enter into any contract supporting research the specific purpose of which is to destroy human life or incapacitate human beings." Warning that secrecy undermined the "unfettered search for truth and its free dissemination," the new rules also barred the university from accepting contracts that required external approval prior to publication unless the research would "make a significant contribution to the advancement of knowledge."[53] WRL's contracts did not meet the bar.

In 1972, the Regents severed U-M's ties to the laboratory.[54]

This move mirrored events around the country. In the early 1970s, university leadership, as well as many scientists and students, determined that much of their Defense-funded research was hardly politically and ethically neutral. Most universities concluded that large, classified defense research facilities were fundamentally at odds with their institutional missions and values. MIT, Stanford, Columbia, Cornell, University of Chicago, and others disaffiliated from their Defense funded laboratories. Appalled by the extent to which the agendas of engineering and the sciences had been directed at weapons research—a phenomenon explained in more detail in the next section—many scientists and engineers sought to reorient their work away from defense questions toward finding solutions to pressing environmental and social challenges.[55] Security funding returned to campuses in the 1980s, but its scale was significantly smaller; universities by and large did not return to managing the controversial secret laboratories of the early Cold War. Rather, many institutions, including the American Physical Society and the American Mathematical Society, refused to participate in research related to the Strategic Defense Initiative, despite huge funding opportunities.[56]

WRL's Lessons for the U-M/LANL Facility

The story of WRL demonstrates that government sponsored, security-focused, largely classified research facilities are controversial because they are poorly aligned with the missions and purposes of higher education: advancing knowledge through undirected and publicly shareable research and training new generations of scholars. U-M tried to reconcile this misalignment by keeping the facility at arms' length, and later, by integrating it more into campus. Both strategies failed.

WRL's history also demonstrates that invoking factors like the potential civilian benefits of security research, the prestige federal sponsorship confers on researchers and their institutions, and national security imperatives fail to overcome the contradictions between the missions of security-sponsored, highly classified research facilities and higher education. Contrary to claims that WRL was instrumental to U-M's academic prestige and scientific capabilities, its closure did not negatively impact the university's intellectual enterprise.[57] Nor did it make the nation more vulnerable.

They explain that bringing "the biggest, baddest, fastest computer in the world" to U-M is what Los Alamos must do "to protect our citizens here in the United States."

The history of Willow Run Laboratories offers criteria useful for evaluating the U-M/LANL facility's likely implications for research, teaching, and public benefit.

Alignment with U-M's research and teaching missions: How integrated will the facility be into U-M faculty research? What role will the LANL center and the U-M center play in training students?

These are especially important considerations given U-M's outsized financial contribution to the facility in comparison to its support of campus research endeavors. These evaluative criteria are also complicated, because as WRL showed, integration risks intellectual militarization and moral concern, while separation conflicts with the university's mission.

U-M officials have claimed that faculty research will be distinct from LANL's nuclear weapons studies.[58] They have also acknowledged, however, that they will most likely not know what research is occurring in LANL's computing center.[59] This means that the bulk of the facility will be unaligned with U-M teaching and research. Yet, U-M and LANL officials have stated that they intend to generate collaborations between university and LANL researchers. They state that the partnership

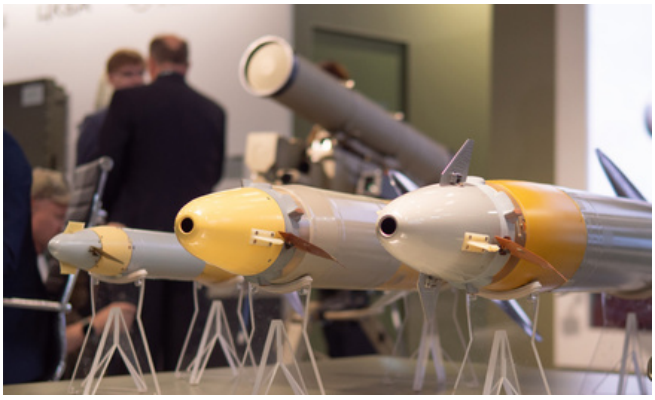
offers "opportunities to design joint workforce development programs and educational programs for students and trainees."[60] The university has already hired LANL scientists as joint faculty in anticipation of the facility's development.[61] While this might align the facility with U-M teaching and research, it also threatens to divert the direction of research fields toward classified nuclear weapons research, as the next section demonstrates, conflicting with the core values of unfettered academic inquiry and knowledge-sharing.

Research dissemination and knowledge sharing: To what degree will the new facility's research be classified, and to which degree will it be publicly shareable?

Neither U-M nor LANL officials have specified the precise research questions that they will pursue at the facility. Nor have they indicated what percentage will be classified. However, 85% of the facility will be devoted to LANL researchers, and LANL leadership has acknowledged that the facility will focus predominantly on its nuclear weapons responsibilities. It is highly likely that the facility will, like WRL before it, be dominated by classified research.

Public Benefit: How will U-M deliver on its bold claims to academic scientific benefits, institutional prestige, national security, and public benefit?

The partnership's leaders consistently claim that the facility will "provide researchers with the computing capacity to solve the world's most complex challenges" in medicine, climate resilience, and clean energy. It will establish the university as "a national leader in advanced computing and scientific research," create around 200 permanent knowledge economy jobs, and attract other industries to the region.[62] These claims are common with innovation investments but rarely evaluated once investments are committed. The history of defense research "spinoffs," below, shows that public benefit typically trails military technology developments.



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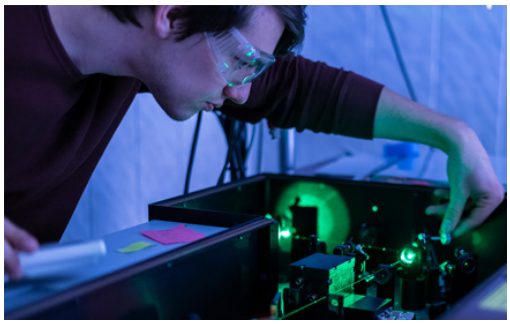
Lessons from Cold War Security Research: The Militarization of Science and Technology

The history of federal support for the sciences and engineering since World War II builds on the lessons from WRL. It shows that Defense research patronage reshaped the trajectories of entire research fields toward national security interests and away from curiosity-driven inquiry. As a result, research designed for civilian, rather than military benefit has been subordinated to national security.

Universities in Service of National Security

During World War II, the U.S. government invested unprecedented funds into academic research relevant to wartime needs. These investments changed the relationship between universities and the government. Basic, exploratory research in particle physics and electromagnetic radiation in the first half of the twentieth century serendipitously laid the groundwork for discoveries that helped the United States win the war: microwave radar, proximity fuses, and the atomic bomb. Those wartime advances were achieved not by government employees in federal labs, but by civilian researchers working on government contracts. The war's lesson was that academic research funded by the federal government but conducted in academic settings held the most promise for independent and innovative research relevant to the nation's defense.[63]

The new relationship between the federal government and academia continued after the war. It reshaped the trajectories of entire research fields. Physics offers an instructive example. In an ideal world, after WWII ended, physicists would have returned to prewar curiosity-driven research. But government investment privileged the investigations most likely to yield national security applications. By 1949, the Defense Department and the Atomic Energy Commission (the agency tasked with overseeing atomic research) provided 96% of all federal research funding in the physical sciences, including engineering, on university campuses.[64] This was not due to a natural affinity between national security and research, but to the dearth of funding for research from non-military sources. Federal money was not dedicated exclusively to weapons development. Defense agencies strategically supported basic and applied research that they thought had the most potential for national security technologies.[65] And as WRL's history shows, universities sought federal funding because it offered reputational benefits and access to otherwise inaccessible, classified knowledge.



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National Security Agency Investments Reorient Science and Engineering toward Weapons Development

These investments changed the expertise of physicists. By the mid-1960s, seventy-five percent of PhD graduates focused on either nuclear or solid-state physics (applicable to militarizing military technologies), the fields most generously funded by national security agencies. This also affected the scholarly legitimacy of different fields. Speculative, curiosity-driven research into areas like cosmology and quantum theory were denigrated as "not even being 'real physics.'" "Real physics" was work that solved pragmatic problems of security and defense.[66]

Engineering, too, was reshaped by military need. During the early Cold War, accredited curricula in electrical engineering pivoted to match the intellectual interests of deep-pocketed military patrons. The government interest in electronic warfare, for example, led to an increased emphasis on topics that were rarely taught before the war, like electromagnetic waves and communications. Likewise, training in nuclear engineering stressed areas relevant to weapons development.[67]

Even "Basic" Research Becomes Securitized

National security agencies' influence on the direction of research was a process of mutual accommodation, not one of coercion. As WRL's "Teaching Faculty" grant program showed, security agency largesse encouraged scholars to portray their research interests as militarily relevant to attract research funding. Emeritus U-M historian Paul Edwards explains that security agency grants did not "need to direct research and development in detail." Rather, they worked to "orient scientists… toward a general problem area." Grant writing often operates "as a kind of make-believe," in which scholars use the language of security to gain funding.[68] During the Cold War, researchers acknowledged that the scale of military support in comparison to domestic government, philanthropic, and industry sources made it difficult to refuse. Scholars from physics and engineering to psychology and philosophy painted their projects blue throughout the Cold War.[69]

In short, security agency patronage shapes the sciences and engineering in the direction of national security goals. This is true even when research questions are not focused directly on military applications. Since World War II, large-scale federal patronage programs have encouraged researchers to paint their projects blue—to pursue questions that align with deep-pocketed sponsors' interests and methods.

U-M/LANL Partnership Will Reorient Research toward National Security Concerns

This is particularly important with regard to the U-M/LANL partnership. The scale of investment in the facility dwarfs investments in many other research areas. As this brief has shown, research fields—what scholars study and how students are trained—are strongly shaped by funders' interests. The partnership risks making U-M's high-performance computational science research dependent on LANL, pushing it in the direction of questions related to nuclear weapons stewardship. That may increase the burden of security classification on researchers and decrease possibilities for open dissemination. In addition to shaping the direction of inquiry, the partnership risks making emerging research fields, as well as student training and scholars' reputations and careers, dependent on security agency funding.

The risks to curiosity-driven, unclassified academic inquiry are heightened in the current federal funding context. The recent dramatic reductions in the budgets of civilian agencies, including the National Science Foundation and the National Institutes of Health, put increased pressure on researchers to fit their questions to available funding. Meanwhile the White House plans to further reduce DoE funding for civilian technologies, like clean energy, and increase funding for nuclear weapons research.[70]

Despite Civilian Applications, U-M/LANL Facility Ties U-M to Nuclear Weapons Development

A single research subject is often relevant to multiple areas. Fundamental research into particle physics is relevant to the study of the solar system; it is also critical to nuclear weapons. In fact, there are not often clear-cut boundaries between "security" and "civilian," or "pure" and "mission-oriented" research. Rather than innate characteristics of research areas, these categories developed out of Congressional efforts to address scientists' concerns about the overclassification of scientific knowledge caused by military patrons during the Cold War.[71]

Computers are a particularly flexible technology. One of the first widely used computational methods, the Monte Carlo simulation, was developed by Manhattan Project scientists to simulate neutrons' random behaviors, critical information for the development of the hydrogen bomb. The method is widely used today in scientific research, finance, risk analysis, and artificial intelligence.[72] Researchers often point to such "spinoffs" to justify military sponsorship. The term "spinoff" implies that civilian benefits are unworthy of large investments in training and research on their own.[73]

Security agency largesse encouraged scholars to portray their research interests as militarily relevant to attract research funding.

This flexibility is precisely why LANL is interested in partnering with U-M. The five-year, $15 million LANL project grant to U-M that preceded the current partnership seeks to advance high-performance computing for "efficiently characterizing the behavior of turbulent plasma."[74] That research is applicable to nuclear fusion—to advancing nuclear energy applications, understanding the origin of stars, and modeling new generations of nuclear weapons. Deputy Director for Science, Technology, and Engineering at Los Alamos, Patrick Ritch, explains the flexibility of the planned facility's research as a "loop" between U-M scientific research and the U.S. nuclear arsenal: "We want this loop to include large investments in national security, so that spins back into the basic science, and what we learn here—that list of non-nuclear weapons stuff—spins into nuclear weapons."[75]

As U-M efforts to portray WRL's ballistic missile tracking observatory as a civilian installation showed, advocates of national security patronage have used the "loops" between civilian and military applications and the potential for "spinoff" technologies to deflect criticisms of military projects. U-M officials have used this method to downplay the proposed facility's ties to nuclear weapons research. They acknowledge that LANL uses high-performance computing to study "aspects of nuclear security research." But they point repeatedly to other areas the facility's computers can address, such as "cancer treatment, drug development, energy resilience," and AI.[76] However, history suggests that this is a distinction without a meaningful difference. National security agencies fund university projects that may appear unrelated to their defense mission because they expect that seemingly unrelated research to inform their missions.

As LANL's hopes for research "loops" indicate, research that is not immediately focused on nuclear weapons is intended to be relevant to their advancement. The scientific computing technologies that U-M researchers may develop in their studies of cancer treatments, cleaner energy technologies, and extreme weather may be equally useful to LANL researchers modeling the degradation of the current nuclear stockpile and designing new weapons. By housing this facility, U-M is tied to the U.S. nuclear weapons program even though researchers may also engage in computational research aimed at environmental, energy, health, and other non-security problems.

This also means that claims by partnership leaders that modeling "aspects of nuclear security research" is "fundamentally different from manufacturing, testing or producing nuclear weapons" is dubious.[77] As the history of Cold war physics and engineering shows, national security agencies fund fields of study because of their relevance to their agencies' development of military technologies. By investing heavily in the LANL facility, U-M is tying the university's reputation, as well as its research in scientific computing and allied fields, to the U.S. nuclear weapons program. This partnership thus has moral, as well as intellectual, implications. Scholars concerned about the outsize impact of security interests on research have noted that when security needs drive research and training, they risk educating a new generation of scholars "unable to envision a world at peace."[78]

National security agencies fund university projects that may appear unrelated to their defense mission because they expect that seemingly unrelated research to inform their missions.

By partnering with LANL, U-M also exposes itself to public concern about U.S. military activities. In times of broad public support for U.S. military buildup and intervention, the reputational costs may be low. But as the Vietnam War experience showed, when the American public opposes U.S. military activities, universities implicated in national security work court controversy and reputational harm.

The partnership's ability to deliver civilian benefits is also questionable because the barriers to moving classified research findings and methods into the public domain are high. Here, WRL's experience is instructive. The labs' remote sensing technologies could have also been used to detect environmental harms like corn blight, oil spills, and deforestation. But when Willow Run's remote sensing experts tried to share their technology with U-M environmental scientists, their military sponsors blocked them. The lab's remote sensing technologies were too militarily important to reveal publicly.[79] Without clarity on what research the U-M/LANL facility will perform, and how much of it will be classified, the partnership's public benefits remain hazy at best.

The Michigan Memorial-Phoenix Project: An Alternative Model for Socially Beneficial Research

It is possible to do pathbreaking, curiosity-driven research without yoking it to national security missions. In fact, a visionary group of U-M students and faculty have done it before.

In 1948, U-M launched the Michigan Memorial-Phoenix Project. Created by U-M students, alumni, and Regents, the project was dedicated to Michiganders who died in World War I and II. Instead of an inert monument, it was a living, "functional memorial" devoted to studying peaceful uses of the atom with "the same determination and enthusiasm as the Manhattan project explored the destructive aspects."[80]

It is a useful reminder of the past ingenuity of U-M students and leaders and firm evidence of the public and peaceful benefits that can accrue to science and society with intentional and principled institutional design.

The project was remarkable for its optimism and foresight. In a postwar research context marked by hyper-securitization, nationalism, and secrecy, the Phoenix Project embraced a hopeful vision of the public and international benefits that could come from privately funded academic research with non-militarized purposes.[81] Anticipating the negative consequences that would flow from government contracts in the Cold War, the Phoenix Project creators rejected federal funding as an impediment to intellectual independence, knowledge dissemination, international collaboration, and student training.[82] Remarkably, the project's commitment to peaceful atomic research predated the Eisenhower Administration's Atoms for Peace research initiative by five years.[83]

By 1955, the memorial attracted over $7.4 million dollars—the equivalent of $92.5 million in 2026—in largely unrestricted gifts from alumni, philanthropy, and industry.[84] Project advocates included Detroit automakers; U-M students and faculty; and a number of public luminaries, including Secretary of State Goerge Marshall, writers C. S. Lewis and E. B. White, playwright Arthur Miller, and actor/director Orson Welles.[85]

The project offered seed grants to faculty and students across a variety of fields. It intentionally cultivated studies that were not likely to be militarily relevant. The result was a broad, multidisciplinary research agenda that yielded multiple peaceful applications of the atom. They included the development of the bubble chamber, which resulted in a Nobel Prize; radiocarbon dating technologies; new cancer treatments and radiation therapist training programs; technologies for food decontamination and preservation; and new national and international policies for the regulation of nuclear materials.[86] The project's nuclear reactor also trained generations of engineers and physicists from around the world, international cooperation made possible by the fact that it was an unclassified facility.[87]

The Phoenix Project contrasts sharply with the U-M/LANL Project. It is a useful reminder of the past ingenuity of U-M students and leaders and firm evidence of the public and peaceful benefits that can accrue to science and society with intentional and principled institutional design. Its freedom from national security agency demands supported intellectual autonomy and curiosity-driven research. Freed from the limitations of security classification, the project's researchers worked on campus. The project was, by design, fully integrated into the university's research and teaching missions. It stood out in the Cold War as a nuclear research program that had nothing to do with nuclear weapons. It enhanced the international reputation of the university, including leading to at least one Nobel Prize, and the technologies that it supported were not military spinoffs. Instead, they were pursued precisely for their potential civilian benefit.

CONCLUSION AND RECOMMENDATIONS

In 1949, physicist Lee DuBridge, president of CalTech and former head of the MIT Rad Lab, warned, "When science is allowed to exist merely from the crumbs that fall from the table of a weapons development program, then science is headed into the stifling atmosphere of 'mobilized secrecy.'"[88] His words were prescient. The history of national security agency-funded science and engineering research produces a sobering assessment of the U-M/LANL partnership.

U-M's experience with Willow Run Laboratories, combined with similar events at other leading universities, demonstrates the nearly insurmountable challenges that universities face when they sponsor and manage national security-funded, predominantly classified facilities. These challenges are inherent in such partnerships because they are misaligned with the research, teaching, and knowledge dissemination responsibilities of higher education. These conflicts led U.S. universities to withdraw from such relationships over fifty years ago.

Photo credit: Gorodenkoff - stock.adobe.com

The U-M/LANL partnership is a step backwards. The history of the militarization of scientific inquiry in the Cold War suggests that the partnership will reorient entire fields of inquiry and student training towards questions related to nuclear weapons stewardship. It will make those fields dependent on further security agency funding. It will increase security classification and decrease knowledge sharing and opportunities for collaboration with other institutions and scholars, especially international collaboration. It will also reshape student training in those fields in securitized directions. Despite claims that the partnership will produce civilian benefits, it treats civilian applications as secondary, while using them to justify the partnership.

University officials have deployed the shopworn Cold War rhetorical arsenal in an effort to separate the facility's research from weapons applications. But history shows that this is a distinction without a difference. This partnership implicates U-M directly in nuclear weapons development even though the facility will not physically hold fissionable material. This is true even though U-M researchers may also engage in computational research aimed at environmental, energy, health, and other areas.

The argument that U-M can only advance research and public benefit through a partnership with a national laboratory tasked with nuclear weapons modernization is yet another page in that shopworn arsenal. This argument treats civilian research applications as "spinoffs" rather than the purpose of research itself. What if instead of investing in military technologies and weapons during the Cold War, scientists and engineers had invested their intellect and resources into knowledge and technology for public benefit? We cannot know the answer to that question, but the Phoenix Project shows it was possible. Researchers today have the opportunity to pursue high performance research computing (which, in fact, they already do) free of the constraints of mission agency funding.[89]

Instead, the U-M/LANL partnership implicates the university in nuclear rearmament and international nuclear proliferation. The end of the Cold War sparked international disarmament. Between the late 1980s and 2010, the nuclear-armed nations' arsenals dropped from over 70,000 nuclear warheads to fewer than 12,000. After a decades-long freeze on designing and building new nuclear weapons, the United States launched a $1.7 trillion dollar program to update and expand its nuclear arsenal. LANL's mission is predominantly focused on this task. U.S. nuclear modernization and expansion has triggered other nations, including Russia, China, India, and Pakistan to do the same.[90]

Rather than deflecting concerns about the partnership's ties to nuclear weapons research using tired Cold War rhetoric, U-M and LANL leadership should transparently disclose more specifics about the project and assess the degree to which it fulfills or conflicts with the university's research, teaching, and public responsibilities. Given the scale of financial investment in this project, it is incumbent upon the university to publicly and forthrightly address a number of questions:

- What precise research and teaching will happen at the facility?
- How militarized and securitized will LANL's and U-M's respective research portfolios be?
- Approximately how much of the facility and its likely research outputs will be publicly available? How much will be classified, and at what level of classification?
- What proactive measures does U-M plan to take to offset the likely securitization of its high-performance computational research and allied fields? The likely securitization of student training?
- What are the opportunity costs to the rest of U-M research from the university's deep financial investment in the project?
- What are the planned pathways from research investment in the civilian applications U-M claims the facility will produce—pharmaceutical innovations, cleaner energy, and other areas that university officials have touted—to concrete deliverables that are accessible to the public?

Answers to these questions may only be preliminary, but they are a necessary first step to robustly addressing the grave intellectual, institutional, and public challenges that history shows this project poses. The partnership's impact on the future of U-M's research and teaching missions, and its impact on the community where it will be sited, demands a transparent, university-wide fact-finding mission and binding deliberation, involving faculty, students, staff, and community stakeholders, as well as experts on the governance of research and higher education, to determine whether it is aligned with or in conflict with U-M's research, teaching, and public responsibilities.

If the deliberating body determines that the project is suitable for U-M, university leaders must work with experts in science and technology policy, higher education administration, and other fields to develop proactive, transparent, and ongoing governance mechanisms designed to mitigate the intellectual and institutional risks the partnership poses to curiosity-driven scholarship, the securitization of high-performance scientific computing, and the moral and reputational costs of wedding the university to a nuclear weapons research facility.

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90. W. J. Hennigan, "The Price," New York Times Oct. 10, 2024, https://www.nytimes.com/interactive/2024/10/10/opinion/nuclear-weapons-us-price.html