

FEDERAL PRIORITIES

PREPARED FOR THE NEW MEXICO CONGRESSIONAL DELEGATION
FISCAL YEAR 2021



OPPORTUNITY DEFINED



THE UNIVERSITY OF
NEW MEXICO®

UNM 2021 FEDERAL PRIORITIES

APPROPRIATIONS

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Center of Excellence in Directed Energy

SUBCOMMITTEE: LABOR, HEALTH AND HUMAN SERVICES, EDUCATION

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The Preparation and Development of Aspiring Rural and Indigenous Teachers and Leaders

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Center for High Technology Materials

Center for Water & the Environment

Clinical & Translational Science Center

COSMIAC

GRAND CHALLENGES

Center of Excellence in Directed Energy

Federal Agency: Air Force Research Laboratory (AFRL)

Federal Agency Program Office: Line: 16 PE: 1206601F Title: Space Technology

Current Federal Funding Level: \$138.598 million

President's FY21 Budget Request: TBD

UNM Contact: Arash Mafi, Director of CHTM, Professor of Physics & Astronomy, 505-485-5574, mafi@unm.edu

FY 2021 Requested Amount: \$143.603 million

JUSTIFICATION

This federal priority supports the establishment of a Directed Energy Center of Excellence and aims to enhance the research portfolio of UNM in high power lasers and microwaves. The funding provided for the Center of Excellence would allow for UNM to boost its collaboration on directed energy with the Department of Defense, especially with the Directed Energy division of the Air Force Research Laboratory (AFRL) and the High Energy Laser Joint Technology Office (HEL-JTO), both of which reside in Albuquerque. There is a growing need for enhanced collaboration between universities and defense laboratories in this area to achieve higher power and more intelligent sources of directed energy, which is directly tied to the national security of the United States. There is also an increasing demand for technical workforce development in this area, especially at UNM, given its proximity to the Directed Energy division at AFRL.

REQUESTED REPORT LANGUAGE

"The Committee is pleased to see that the Department is increasingly focused on the threats and challenges of directed energy, including directed energy microwaves and lasers. Given the large, skilled workforce needed in this critical area in the future, the Committee supports greater collaboration between universities and defense labs and encourages the Secretary to establish one or more centers focused on directed energy research, education, testing, and technology transfer."

BACKGROUND

Directed energy (DE) lasers and microwaves are a technology that offers the ability to deliver energy to a target at the speed-of-light with a very deep magazine. Advances in pulsed power technology, batteries, capacitors, and electronics have all contributed towards making directed energy a reality. The University of New Mexico (UNM) has the top University research program in DE microwaves in the country. It now seeks to ramp up an equally strong program in DE lasers. This Center of Excellence will be highly aligned with AFRL's Directed Energy Directorate (RD).

RATIONALE

UNM intends to use money to support additional graduate students in the Applied Electromagnetics program in Electrical and Computer Engineering (\$1 million) and also ramp up a research program at The Center for High Technology Materials (CHTM) to support DE lasers through funding for graduate students and enhancing laboratory infrastructure (\$4 million).

DESCRIPTION

UNM has had a 31-year program in DE microwave (high power microwaves—HPM) which was started by Prof. EdI Schamiloglu in 1988. More than 60 M.S. and Ph.D. students have graduated from this program, with many of them currently employed at AFRL/RD. In fact, the two key technical leads of the successful THOR demonstrator at AFRL received their Ph.D. under Prof. Schamiloglu. CHTM was established by the State of New Mexico in 1983 and has performed research and graduated many students in photonics, optoelectronics, nanotechnology, and quantum dot and fiber laser technology. Prof. Mafi became the fourth Director of CHTM in 2016. UNM is thus in an excellent position to host a Center of Excellence in Directed Energy. This support will enable CHTM to rapidly pivot to become a leading academic research center within the DE laser research community.

IMPACT ON UNM/NM/U.S.

By establishing a DE laser research program alongside the ongoing highly successful DE microwaves program, UNM will emerge as the nation's leading university in Directed Energy which will be highly aligned and synergistic with AFRL's Directed Energy Directorate. UNM will be the Nation's leader in educating M.S. and Ph.D. scientists and engineers to contribute to the manpower requirements of AFRL, Sandia National Laboratories, Los Alamos National Laboratory, and various large and small businesses in Albuquerque and New Mexico.

Addressing the Challenge of Alcohol and Polysubstance Use in the Context of the Opioid Crisis

Federal Agency: National Institutes of Health (NIH)

Federal Agency Program Office: National Institute on Alcohol Abuse and Alcoholism (NIAAA)

Current Federal Funding Level: NIAAA Extramural: \$435.6 million

President's FY21 Budget Request: TBD

UNM Contact: Katie Witkiewitz, Regents' Professor, Department of Psychology and Center on Alcoholism, Substance Abuse, and Addictions, 505-925-2334, katie@unm.edu

JUSTIFICATION

The opioid epidemic is a public health emergency. Often overlooked, alcohol continues to kill more people daily than opioids. Moreover, recent research has highlighted that alcohol use combined with other substance use, particularly opioids, sedatives, and stimulants (e.g., methamphetamine) is increasingly killing people—an emerging public health emergency. For example, alcohol is involved in approximately one-quarter of deaths involving opioids. In the past year the rates of overall opioid deaths have declined by 4.5%, but deaths caused by benzodiazepines, cocaine, or methamphetamine increased by 6.7% and deaths from fentanyl combined with benzodiazepines, cocaine, and methamphetamine increased by 11%, 14%, and 31%, respectively. NIDA and NIAAA typically fund research project grants and research centers that are focused on individual drug classes (e.g., methamphetamine research), and there is only one program announcement for small exploratory/development grants targeting research on polysubstance abuse.

Given the scope of the problem and lack of funding to support programmatic research on polysubstance use, a NIAAA Comprehensive Alcohol Research Center is critically needed. This center must be devoted to biomedical, applied, and implementation research on the intersection of alcohol, opioid, and other substance co-use (alcohol/polysubstance use). As with opioids, problems with alcohol/polysubstance use are exacerbated in areas with less resources including in rural or impoverished regions and among disenfranchised populations (e.g. racial and ethnic minorities).

REQUESTED REPORT LANGUAGE

"The Committee is concerned that the President's budget request seeks to cut funding for NIAAA and rejects that guidance. The Committee is pleased to see that NIH supports research on alcohol/polysubstance use, but urges the Director to increase research in this area through more comprehensive centers across the US. Given the increasing prevalence of polysubstance deaths, particularly amongst rural and minority communities, the Committee also encourages the Director to focus one or more centers on rural and minority communities with high rates of alcohol and polysubstance use mortality."

BACKGROUND

This request seeks to initiate funding to address the problem of alcohol co-use with other substances. Research gaps that have yet to be explored include: (1) lack of research on the role of alcohol and other substances in exacerbating the opioid problems; (2) little attention to determinants (e.g. physical and psychological pain) of comorbid alcohol/polysubstance use disorders; and (3) a paucity of research on alcohol/polysubstance use treatment with racial/ethnic populations beyond non-Hispanic White individuals. New Mexico is a tri-ethnic state with particularly high rates of alcohol mortality, as well as opioid, sedative, and stimulant use. Moreover, The University of New Mexico (UNM) is an Hispanic serving institution and is thus uniquely poised to address this gap.

Researchers at UNM have considerable expertise in studying alcohol and other substance use trajectories, prevention, and treatment of substance use disorders (e.g., psychosocial, medication, comorbid mental

health disorders, comorbid pain). Additional funding in these areas will improve the health and well-being of New Mexico citizens and will ensure that UNM is a leader in the prevention and treatment of alcohol/poly-substance use disorders. UNM's Center on Alcoholism, Substance Abuse, and Addictions is uniquely suited to address these needs, given its 28 years of experience in developing, evaluating, and disseminating effective prevention and treatment programs that target alcohol and other substance use; established connections with providers in rural and urban communities; and extensive work examining racial and ethnic disparities and other determinants of alcohol and polysubstance use.

RATIONALE

Funding research on alcohol/poly-substance use disorders is critical for addressing alcohol mortality as well as the opioid epidemic and the emerging public health crisis associated with sedative and stimulant over-doses. Similarly, funding is crucial for research on the prevention and treatment of co-occurring alcohol/poly-substance use among individuals in ethnic and racial minority groups, particularly those in rural and impoverished regions. This would allow UNM to excel as a national leader in conducting impactful research into this recently highlighted public health issue.

DESCRIPTION

A new center grant program at NIH would potentially lead to an award for the UNM Center on Alcoholism, Substance Abuse, and Addictions (CASAA) devoted to research on alcohol, opioids, and other substance co-use. The request urges Congress to include language in FY21 regarding program direction to address this important gap in funding allocated to combat the opioid epidemic, specifically the role of alcohol/poly-substance use, treatment of alcohol/poly-substance use disorder, and the nexus of risk created by living in rural and impoverished communities with racially and ethnically determined health disparities.

IMPACT ON UNM/NM/U.S.

The research supported by this program would provide critical funding to bring together numerous faculty researchers with unique expertise to address the problem of alcohol, opioid, and other substance co-use (polysubstance use). Researchers will also enlist and train post-doctoral fellows and graduate and undergraduate students in this research. CASAA has been studying the prevention and treatment of alcohol and other substance use disorders for over 28 years. At least 86 faculty members, 8 post-doctoral fellows, and 15 graduate students within UNM share interests in topics covered under this program. The research provided by this program would also make a meaningful difference in the lives of New Mexicans, particularly those who have been disproportionately affected by alcohol mortality, the opioid crisis, and other substance use disorders (especially methamphetamine). Given the racial/ethnic diversity of New Mexico and the growing racial/ethnic diversity of the United States that will ultimately resemble that of New Mexico, the research conducted at UNM will provide new knowledge that will be generalizable to increasingly diverse United States communities.

Continued Funding of C06 Research Facilities Construction Grants

Federal Agency: National Institutes of Health (NIH)

Federal Agency Program Office: National Center for Advancing Translational Science (NCATS)/Office of Research Infrastructure Programs (ORIP)

Current Federal Funding Level: C06 Grants are currently funded at \$50 million

President's FY21 Budget Request: TBD

UNM Contact: Richard Larson, MD, PhD, Executive Vice Chancellor for Health Sciences, 505-272-5102, rlarson@salud.unm.edu

FY 2021 Requested Amount: \$50 million

JUSTIFICATION

NIH Research Facilities Construction Grants through the C06 mechanism provide much-needed matching funds to support universities in modernizing and expanding their research infrastructure. These funds are an investment in both future biomedical research and in local economies through the construction process. This mechanism was renewed but limited to core facilities. UNM Health Sciences has not been able to build a research building without these funds, similar to other public universities in more rural states. As a result, we are seeking to broaden the application of these funds to research buildings from the restriction to research core facilities.

REQUESTED REPORT LANGUAGE

"Congress requests continued appropriations to the NIH C06 mechanism in the amount of \$50 million per year with at least 25% being awarded to Centers of Emerging Excellence."

BACKGROUND

The NIH/ORIP C06 grant program provides federal funds for construction or major remodeling of biomedical research facilities. For the University of New Mexico, such funds would enable construction of a state-of-the-art expansion of space for programmatic research relevant to some of the state's most pressing problems. Recipient organizations are required to provide matching funds under this program.

RATIONALE

This program would provide funding to construct or expand and modernize research facilities on the UNM Health Sciences Center campus. The additional space will support programmatic expansion in key research areas important to the health of our state. These strategic areas of research focus have been and will continue to be developed so we can continue to address health issues that greatly impact New Mexicans. Currently, UNM Health Sciences has a 160% utilization of space in comparison to university norms.

DESCRIPTION

If continued appropriations are allocated to this program, it would provide Federal funds to extend local funding for much-needed, state-of-the-art facilities.

IMPACT ON UNM/NM/U.S.

In New Mexico, UNM's strengths in translational science and the work of faculty, students and staff toward new treatments would be expanded and UNM HSC further established as a national leader in these fields. Nationally, there is a lack of construction funds at public universities that qualify under the Centers of Emerging Excellence designation, such as UNM. The new insights and treatments enabled through state-of-the-art facilities would improve lifespan and quality of life for individuals with health challenges throughout the U.S.

The Preparation and Development of Aspiring Rural and Indigenous Teachers and Leaders

Federal Agency: Department of Education (U.S. DoED)

Federal Agency Program Office: Office of Postsecondary Education: Strengthening Native American-Serving Institutions.
Identification code 091-0201-0-1-502; Program activity code Identification code 0009

Current Federal Funding Level: \$3.8 million

President's FY2021 Budget Request: TBD

UNM Contacts: Glenabah Martinez, Associate Professor, Language, Literacy, and Sociocultural Studies (LLSS), and Director of Institute for American Indian Education, glenie@unm.edu; Sheri Williams, Associate Professor, Teacher Education, Educational Leadership & Policy (TEELP), ssw@unm.edu

JUSTIFICATION

This federal priority supports the College of Education's (COE) Institute for American Indian Education (IAIE) and its efforts to establish and support a pipeline that prepares Indigenous students to achieve academic success and contribute to their communities. IAIE's aim is to prepare and develop aspiring rural and Indigenous students to matriculate and complete their education and become teachers and leaders who will implement effective cultural and heritage language programs for PreK-12 students in New Mexico. This funding will further allow UNM's COE to build upon successes and impacts and pursue future grant funding and cooperative agreements. The COE prioritizes research, professional development, and community engagement efforts that improve educational outcomes and holistic development of individuals along a continuum of learning, from birth throughout life. Professional development and research supported through this initiative would directly advance the mission of IAIE by: engaging Indigenous faculty who represent the 23 sovereign nations and form an interdisciplinary team to work on Indigenous education issues; advancing several of the objectives identified by the IAIE leadership team and community partners; catalyzing a program with the U.S. Department of Education that can be sustainable beyond the federal initiative; and providing a culturally relevant educational pathway in PreK-20 education. The initiative would benefit New Mexico by building a seamless infrastructure that supports a long-term comprehensive approach to prepare pre-service educators, administrators (K-12 and higher education), non-teaching education professionals, researchers, and policy makers to work with Indigenous People in NM. IAIE and its community partners have recognized that colleges must provide professional development for administrators on the Indian Education Act and the means to increase the presence of Indigenous People in schools. The need for reform is pressing and is incumbent upon us to respond to NM Native Nations with purposeful planning and action.

REQUESTED REPORT LANGUAGE

"The Committee urges the Secretary, through the Office of Postsecondary Education's Strengthening Native American-Serving Institutions Program, to support the preparation and development of aspiring rural and Indigenous teachers and leaders towards implementation of effective cultural and heritage language programs for Pre/K-12 students."

BACKGROUND

NM has 23 sovereign nations and UNM is located in the midst of one of the largest concentrations of tribes in the U.S. NM has 35,000 Indigenous students in public schools, and 6,000 in the 28 Bureau of Indian Education (BIE) operated and tribally-controlled schools. Indigenous students have the lowest achievement scores and highest dropout rates among ethnic groups nationally and in NM. The NM indigenous poverty is 31%. This funding request is to support the preparation and development of aspiring rural and Indigenous teachers and leaders to implement effective cultural and heritage language programs for the cognitive and social development of PreK-12 students in New Mexico and nationally.

The COE and its Indigenous faculty have identified the need to develop inclusive infrastructure of Indigenous faculty expertise, combined with tribal perspectives, to address high-quality education from early childhood to higher education. A priority will be to establish a partnership that prepares Indigenous students to achieve academic success and contribute to their communities.

RATIONALE

There is a critical need to prepare pre-service educators, administrators (K-12 and higher education), non-teaching educational professionals, researchers, and policy makers to work with Indigenous People in NM and the U.S. A lack of infrastructure support has prevented a coordinated long-term comprehensive approach to address these issues. In collaboration with NM Public Education (NMPED) Department's Indian Education Office and Northern NM College, UNM hosted the Assembly of NM Native American Educational Leadership. The Assembly, attended by over 100 educators, leaders, and community members, identified the need for teachers to be aware of challenges within the Native Nations and cultural competencies to teach in NM. The Assembly recognized that colleges must: a) provide professional development for administrators on the Indian Education Act; b) increase the presence of Indigenous People in school teaching and leadership positions; and c) develop culturally-rooted school leaders in rural and remote areas.

DESCRIPTION

Community engagement with Native Nations in NM is at the core of teaching, service, and scholarship for Native faculty. UNM will use the grant to work with leadership of the 23 Native Nations and each nation's department of education and school board. Our familiarity with the governing bodies' protocols will enable us to conduct forums and other forms of community engagement. We will work with NMPED's Indian Education Office, NM Indian Education Advisory Board, Indian Education officers and leadership from the 23 public school districts with significant populations of Indigenous students, BIE Area Office, and tribal contract and charter schools to increase the presence of Indigenous educators in schools and create a pathway for educators to teach culturally diverse students in NM. UNM, in collaboration with these partnerships, will provide professional development for administrators on the Indian Education Act. Funds will also sustain efforts to transform curriculum, pedagogy and instructional materials.

IMPACT ON UNM/NM/U.S.

Education administrative authorities and schools—public, BIE, parochial/mission, tribally-controlled, and private—may have similar goals in serving students, but a critical gap exists among these systems. The challenge is to ensure a seamless transition for students who often face hardships in health, economic, educational, and future employment success in order to matriculate and complete their education. We will facilitate an educational pathway in PreK-20 education through comprehensive educational planning efforts to address critical needs and provide a sound foundation for faculty to enhance the services for Indigenous children of NM. The planning process will incorporate families and communities as vital partners reflecting our core principle and the integrity of the project which is founded on the holistic education of Indigenous youth and their Indigenous languages, cultural traditions, and sovereignty.

National Center for Integrating Community Health Workers (CHWs) into Clinical Care

Federal Agency: Health Resources and Services Administration

Federal Agency Program Office: Office of Rural Health Policy

Current Federal Funding Level: \$317.8 million (Office of Rural Health Policy)

President's FY 21 Federal Budget Request: TBD

UNM Contact: Arthur Kaufman, MD, Vice Chancellor for Community Health, akaufman@salud.unm.edu, 505-272-1936

FY 21 Requested Amount: \$2.7 million

JUSTIFICATION

States are eager to learn how their health systems can better address the social determinants of health at the hospital, clinic, agency and community levels. Community health workers (CHWs), long known for excellent service in communities, are relatively new to being embedded in clinical settings and relatively new to receiving funding through Medicaid and hospital sources. New Mexico has created a model for extensive deployment of CHWs through its health systems, which is recognized nationally through federal grant mechanisms, peer-reviewed publications and citations as best practices from such entities as the Commonwealth Fund. New Mexico's Medicaid program now mandates that all Medicaid managed care organizations must fund CHWs. Its flagship UNM Hospital deploys them in all its primary care clinics and emergency department, and they are an important component of virtually all federally qualified health centers in the state.

Driven by the new value-based and capitated healthcare environment, health system representatives from other states have been eager to learn about the different aspects of New Mexico's programs so they can be adapted in the home state. To address this need, the University of New Mexico (UNM) proposes to disseminate its approach and evidence through a National Center that offers workshops and consultations, creates focused manuals, and offers on-line certification and continuing education credits for providers, hospitals and health systems who are all potential employers.

REQUESTED REPORT LANGUAGE

"Congress recognizes the importance of community health workers, particularly in rural and underserved areas, to help address persistent health issues tied to social determinants of health. We are also aware that many states would like to better incorporate community health workers into their systems, but there is currently a lack of a unified training and certification resource available to them. Congress directs the Secretary to create a national center, based at an academic medical center with expertise in integrating community health workers into health systems, to assist states and providers through workshops, consultations, certifications and continuing education credits."

BACKGROUND

"Social determinants" are growing, popularly referenced factors which have a far greater impact on health than does the health system. University of New Mexico data shows that 50% of patients in primary care clinics screen positive for at least one adverse Social Determinants of Health (SDOH); half of those, more than one. But those questions are not traditionally asked, for there was no resource to address positive answers. CHWs, linguistically and culturally competent and living within the low income communities served, have demonstrated a 4:1 ROI when helping screen for and address SDOH among the most costly 5% of healthcare consumers. Despite evidence of improved care quality and cost savings of such screening and intervention, a study by the Robert Wood Johnson Foundation found that 80% of physicians feel they don't know how to address those needs, and the health systems in which they work do not support that effort. While there are numerous training curriculums and certification options for CHWs across the U.S., there is sparse orientation of health systems about the potential value of CHWs to them as potential employers.

RATIONALE

As an academic health center, UNM has long been known for educational and service innovations targeted to priority needs of New Mexico. These models, most recently of Health Extension, have also been disseminated to many other states. The creation of the proposed Center would assist in knowledge dissemination throughout the state and nation. UNM's CHW model has influenced state Medicaid policy and funding proposals through other state agencies, including the Department of Health and Aging and Long Term Services. The County of Bernalillo and City of Albuquerque have adapted the model to their own priority needs, from care for the homeless, those with severe addiction and mental health problems, and those just released from incarceration. A Center would amplify our ability to respond to local, state, and national needs and continue to accelerate resources for UNM to fulfill this promising opportunity tied to a growing, recognized need to improve our stressed healthcare system.

DESCRIPTION

UNM has created an effective clinical site-based and community-linked CHW model incorporating six components replicable in any state. CHWs are deployed in 1) clinical settings (clinics, hospitals, and emergency departments); 2) community agencies (social service agencies, Departments of Health, refugee support centers; 3) centers for high needs individuals (homeless shelters, refugee centers, released inmates); 4) the offices of Medicaid Managed Care organizations; and 5) equipping CHWs with employer-requested specific skills such as Mental Health First Aid, safer opioid prescribing and home visiting to families of first born children. Through the program, employers will learn about various funding opportunities for attracting and sustaining CHWs, including fee for service, per member/per month, employment as a contracted entity, and salaried employment in capitated Medicaid managed care. Employers will learn to measure the impact of interventions on finances, organizational culture and community engagement by a set of developed metrics.

IMPACT ON UNM/NM/U.S.

The grant mechanism will fund up to 5 other states expressing interest in adapting the UNM CHW model. Potential employer groups include community hospitals, federally qualified health centers, long term care facilities, state agencies, local non-profits and a public university interested in participating and offering collaboration with relevant resources related to SDOH. Metrics developed for the impact of CHWs on the health system in New Mexico, will be offered to other interested states for comparison and generalizability of the model.

SBIR/STTR Support for Biomedical Commercialization

Federal Agency: National Institutes of Health (NIH)

Federal Agency Program Office: National Institute of General Medical Sciences (NIGMS)

Current Federal Funding Level: NIGMS is funded at \$2.87 Billion

President's FY21 Budget Request: TBD

UNM Contact: Richard Larson, MD, PhD, Executive Vice Chancellor for Health Sciences, 505-272-5102, rlarson@salud.unm.edu

FY 2021 Requested Amount: \$8 million (\$2 million for each of the four regional hubs)

JUSTIFICATION

Increases in commercialization and technology transfer in the nation's academic institutions translate into human health improvement, economic development, and job creation. The National Institutes of Health (NIH) Small Business Technology Transfer (STTR) program serves as an early-stage funding source for promising biomedical technologies with collaborations between small businesses and academic institutions to create life-saving technologies and therapies. To increase STTR funding, biomedical innovation, and commercialization in the Institutional Development Award (IDeA) states, four regional accelerator hubs were formed to help build an entrepreneurial culture. The Mountain West Hub serves major research universities in New Mexico, Alaska, Hawaii, Idaho, Montana, Nevada, and Wyoming. A continuation in accelerator hub funding will strengthen emerging infrastructure development, entrepreneurial training, education and outreach, and the important process of catalyzing culture change to promote commercialization of products that benefit public health. The initial funding did not allow for renewal of awards. This proposal seeks funding to assure renewal and sustained funding.

REQUESTED REPORT LANGUAGE

"Congress remains concerned with the lower rates of NIH STTR funding in IDeA states compared to non-IDeA states. In response to this discrepancy, NIGMS funded four STTR Regional Accelerator Hubs to help build entrepreneurial cultures in IDeA states by increasing STTR funding opportunities, entrepreneurial training, and technology transfer acceleration. Congress authorizes additional funding to provide that initial awards may be renewed."

BACKGROUND

FY21 funding for continuation of the STTR Accelerator Hubs in IDeA states would support institutions throughout 23 states and Puerto Rico and would help secure programming to increase NIH SBIR/STTR funding in underrepresented regions. Through education, training, and outreach, New Mexico and other IDeA states could compete with non-IDeA states with the goal of more proportionate funding. The western hub, ASCEND (Accelerating Commercialization and Entrepreneurial Development), and the other three hubs have created solutions for gaps in resources, funding, mentoring, technology development, and business consultation. By extending the work of the hubs, institutional leaders can continue to use programming to build culture change in favor of biomedical commercialization and STTR application funding.

RATIONALE

Commercialization and technology transfer coming from academic institutions provides life-saving contributions to human health and boosts economic growth by creating a robust job market. The SBIR/STTR program at The University of New Mexico (ASCEND) is implementing the following resources for the region:

- Online Platform Delivery featuring a searchable resource database
- Entrepreneurial Training including short courses and webinars
- Business Advising allowing innovators to pitch promising technologies to investors
- Mentoring Network allowing for advisement from local and national industry experts
- Technology Development using an SBIR/STTR preparation program

ASCEND staff, internal and external advisory committees, and hub institute leaders worked together on the solution plan for the Mountain West Idea States.

DESCRIPTION

The continuation request would allow the four regional hubs to build on resources and develop a robust sustainability plan and instruction to use robust resources to boost culture change at IDeA institutions. Regional hubs would continue to engage and integrate with other IDeA programming to reach underserved academic institutions. Additionally, continued funding for the accelerator hubs will allow collaboration with other NIH commercialization programs, including NIH's REACH (Research Evaluation and Commercialization Hubs) and NCIA (Centers for Accelerated Innovations). The hubs will prepare the innovators to apply for innovation funding opportunities throughout the NIH.

IMPACT ON UNM/NM/U.S.

Academic biomedical innovation improves human health with live-saving technologies and therapeutics. Today's lab discovery can lead to tomorrow's cure. However, the human health benefit is carried from bench to bedside by creating a product that can be commercialized. UNM, with the Health Sciences Center, serves as the flagship academic research institution in the state and region and will continue to lead the western hub, which is composed of New Mexico, Wyoming, Nevada, Minnesota, Idaho, Alabama and Hawaii. The role of the accelerator hubs is to build resources to help academic institutions become economic development leaders by ensuring students, faculty, staff, institutional leaders, and industry leaders are exposed to a robust entrepreneurial infrastructure and culture.

Sustainable Water Resources and River Management in Arid Regions

Federal Agency: U.S. Army Corps of Engineers (USACE) Engineering Research and Development Center (ERDC)

Federal Agency Program Office: Flood and Coastal Storm Damage Reduction Program

Current Federal Funding Level: \$1.5 million

President's FY21 Budget Request: TBD

UNM Contact: Mark Stone, Associate Professor, Civil Engineering, 277-0115, stone@unm.edu

FY21 Requested Amount: \$4 million

JUSTIFICATION

This federal priority supports the Sustainable Water Resources Grand Challenge (SWR GC) and aims to increase funding to an existing program within the Flood and Coastal Storm Damage Reduction Program of the USACE. The additional funding would allow The University of New Mexico (UNM) to pursue research funding from ERDC via broad area agreements and/or cooperative agreements. The priority research topics are focused on arid and semi-arid regions including: post-wildfire flood impacts and watershed recovery; flexible reservoir operations to address competing demands and climate change; and balancing flood risk reduction projects with environmental needs. Research and training supported through this initiative would directly advance the mission of the SWR GC by: engaging a wide range of researchers from across campus who work on sustainable water resources issues; advancing several of the research objectives identified by the SWR GC leadership team; catalyzing a research program with the USACE that can persist beyond the federal initiative; and providing training, internships, and employment opportunities for UNM students. The initiative would benefit New Mexico by building capacity to deal with the pressing environmental issues of wildfire recovery, endangered species recovery, and sustainable water resources management.

REQUESTED REPORT LANGUAGE

"The committee recommendation includes \$4 million for the Corps' research and development [R&D] program to continue its focus on the management of water resources projects that promote public safety, reduce risk, improve operational efficiencies, reduce flood damage in arid and semi-arid regions, sustain the environment, and position our water resources systems to be managed as systems and adaptable due to the implications of a changing climate. The R&D program should also continue its focus on science and technology efforts to address needs for a resilient water resources infrastructure."

BACKGROUND

The Engineering Research and Development Center (ERDC) is one of the key research facilities for the U.S. Army Corps of Engineers (USACE) with a mission to "Provide science, technology, and expertise in engineering and environmental sciences in support of our Armed Forces and the Nation to make the world safer and better." One area of expertise at ERDC is water resources management and river operations. Since 2003, ERDC has managed an urban flood demonstration project, which focuses on hydrologic research with an emphasis on arid and semi-arid regions. This program has been championed by the Desert Research Institute (DRI) in Nevada and it briefly involved UNM in the period from 2006 to 2009. The program has successfully advanced a range of arid and semi-arid research priorities, including collaborations with the Albuquerque District of the USACE. Funding for the program has been at the \$1.5 million level for the past several years. The goal of this federal priority is to increase the budget to \$4 million. This would be pursued through close coordination with DRI and the delegations from both New Mexico and Nevada. DRI leadership has welcomed this coordination.

RATIONALE

This program will advance the interests of UNM by contributing to the research priorities outlined by the Sustainable Water Resources Grand Challenge, engaging a wide range of researchers from across campus

including Civil Engineering, Biology, Earth and Planetary Sciences, Community and Regional Planning, and others, opening up new opportunities for pursuing research funding from the Department of Defense, and supporting workforce training and professional development programs.

DESCRIPTION

This program would be operated under the auspices of the Sustainable Water Resources Grand Challenge and would be administered through the Center for Water and the Environment and the UNM Resilience Institute. Dr. Mark Stone (Civil Engineering) would serve as the program manager for UNM's involvement. UNM work items and associated budgets would be developed collaboratively with ERDC program managers with input from the Albuquerque District of the USACE, other USACE scientists and engineers, and in coordination with DRI. As appropriate, UNM would be awarded contracts to complete those work items. Dr. Stone would also coordinate with UNM researchers to build the teams for conducting the research.

IMPACT ON UNM/NM/U.S.

The existing program has been, and UNM's contribution will be, focused on critical research questions for supporting the water resources infrastructure of New Mexico and the U.S. The economic vitality of the region is intricately tied to the sustainable management of the Rio Grande. The wellbeing of the Rio Grande, its watershed, and the people who call it home are faced with several urgent challenges as reflected by the research priority areas including: (1) Wildfires: wildfires have continued to increase in intensity, frequency, and size with devastating impacts on the burned area and downstream communities; additional research is needed to improve tools for post-fire recovery; (2) Flexible reservoir operations: existing and aging water resources infrastructure is pulled in many directions to meet competing needs, which is made more complex in a changing climate; and (3) The Middle Rio Grande provides an exceptional test-bed for advancing models and techniques for balancing the needs of flood risk reduction techniques with needs for ecosystem restoration. In coordination with ERDC and DRI, the UNM team will contribute to the production of actionable science that directly improves the management of the Rio Grande and its watershed while also serving as a model for sustainable river basin management in arid climates.

Counter Drone Center of Excellence

Federal Agency: Joint Navigation Warfare Center (JNWC)

Federal Agency Program Office: Joint Navigation Warfare Center

Current Federal Funding Level: Starting in FY20, PE 1202140F will provides RDT&E support to US SPACECOM with the JNWC and Space Analysis and Application Development. Together, those programs are funded at \$13.674 million. JNWC is funded at \$7.427 million.

President's FY21 Budget Request: TBD

UNM Contact: Craig Kief, Director, COSMIAC, 505-934-1861, craig.kief@cosmiac.unm.edu

FY 2021 Requested Amount: \$3 million. PE 1202140F, Joint Navigation Warfare Center, USSPACECOM

REQUESTED REPORT LANGUAGE

"The Committee encourages the Secretary, through the Joint Navigation Warfare Center, to establish a program supporting center-level activities in Counter Drone Technology. The Center will leverage testing facilities through the Major Range and Test Facility Base (MRTFB) program administered by USD (AT&L) and technical expertise at universities and industry to accomplish new research initiatives."

BACKGROUND

This project builds on the past success of the COSMIAC research center at UNM. COSMIAC was established over ten years ago with the support of Congress and has grown today to a self-supporting success story with 30,000 square feet of space and more than 60 staff, students, faculty and consultants to UNM. Part of this work is advancement of unmanned aerial vehicles (UAV) as a drone testbed. This testbed is used to study how vulnerabilities in the use of positioning, navigation and timing signals, like GPS, can be incorporated into defense strategies against threats posed by malicious use of drones. There is tremendous opportunity for advancement of counter drone research and technology through collaboration among New Mexico's national, military and university laboratories as well as other local government agencies and contractors. New Mexico's expansive test ranges serve as ideal locations for practical exercises. There is a currently a vast field of unrealed benefit in collaboration amongst the agencies performing this work and an extreme shortage of cleared young talent to accomplish these goals.

RATIONALE

If UNM is successful, this center will provide a critical national focal point for collaboration on the subject of counter drone research and engineering, increasing UNM's academic presence in this field. Through this center, students will obtain the mandatory clearances and training to begin to solve the needs of the various government entities working on this problem area. Having this program will help UNM recruit engineering students from across the southwest.

DESCRIPTION

This funding will create the Counter Drone Center of Excellence within the COSMIAC research center. COSMIAC is a US-person only center where 95% of all faculty and students have active clearances. Approximately 5,000 square feet of the high bay manufacturing space of COSMIAC facilities would be dedicated to this activity. There will be approximately three faculty and 30 students involved. Work would involve the Air Force Research Laboratory, the Joint Navigations Warfare Center and other government agencies. Routine collaboration between all players would be a cornerstone of this program. Small businesses currently working in the COSMIAC Industrial Accelerator, who are subject matter experts in the field, would be involved in providing training for students as well as directing field testing at White Sands Missile Range.

IMPACT ON UNM/NM/U.S.

For UNM, this activity would provide a robust workforce for mentoring students on future projects in this area as well as involving more underrepresented populations in this rapidly growing field. For New Mexico, this activity would help to combine the separate efforts of the various government entities to help NM more quickly solve problems without duplication of activities. For the US and globally, the malicious use of UAV technology presents a growing threat to national leadership and military organizations around the world.

Peace Engineering for National Security

Federal Agency: Department of Defense

Federal Agency Program Office: AFRL Space Vehicles Directorate

Current Federal Funding Level: N/A New Program

President's FY21 Budget Request: N/A

UNM Contact: Ramiro Jordan, Associate Dean of Electrical Computer Engineering, rjordan@unm.edu, 505-507-3853

JUSTIFICATION

Peace Engineering is the intentional application of science and technology principles for trans-disciplinary system-level thinking to directly build peace and support conditions conducive to peace with safe, ethical deployment of emerging technologies.

REQUESTED REPORT LANGUAGE

"The committee recommends a provision that would direct the Department of Defense (DOD) to develop a coordinated program in Peace Engineering. The committee notes that conflict prevention and peacebuilding advance U.S. national security by addressing risks in an upstream manner and mitigating the need for the U.S. military to respond. The DOD continues to communicate to Congress the need for increased innovations for civilian-led efforts to prevent violent conflict and extremism. While the U.S. continues to remain the most innovative war fighting country in the world, we have yet to lead the world in frontline war mitigation or war prevention technologies. The committee believes that the Department needs a coordinated research effort that aligns with current DOD strategies and is informed by global and commercial developments."

BACKGROUND

There is increasing bipartisan, whole-of-government recognition that conflict prevention saves lives and taxpayer dollars, including through the joint stabilization effort by the DoD, the Department of State (DoS), and the U.S. Agency for International Development (USAID) that was announced in the Stabilization Assistance Review (SAR) published in May 2018. Engineers have the power to play a vital role in the creative solutions that can radically transform the U.S. and global conflict prevention systems. Yet, no standard curriculum for Peace Engineering exists to enable engineers and the engineering industry pathways into this space. Millions of engineers are currently designing tools and products that interact with conflict systems without adequate consideration for how said tools and products may inadvertently cause harm or exacerbate conflict.

Peace Engineering seeks to solve this problem. From the abuse of social media to fuel ethnic cleansing in Myanmar/Burma to the inability of governments to harness big data for effective violence prevention in Latin America to the need for innovative behavior change models to promote peace in the Middle East, there is significant need for U.S. government investment to grow and nurture the field of Peace Engineering. At this juncture, significant investment is needed to support the development of a Peace Engineering curriculum; to support professors and students to refine, assess and begin to teach said curriculum; and to support private development of products and tools to improve peace in the real world, mutually informing the evolution of an educational curriculum of peace innovation and engineering.

The Air Force Research Laboratory is currently the DOD's lead service responsible for Space Technology. Non-governmental organizations (NGOs) have been leading the development of Space Technology for strategic peace, intel, and nonproliferation, but also for remote sensing of CO₂ emission, methane, drought, etc. In the future these areas might fall under President Trump's new Space Force initiative, but for the moment AFRL Space Vehicles Directorate is the lead. Products and ideas coming out of this Peace Engineering consortium will help inform technology development for strategic peace in the Air Force. "The amount of time, effort, and energy the Air Force devotes to peace operations has exploded from almost zero during the last few

years of the Cold War to consume about 10 percent of Air Force flight hours (much more for active-duty fighter, electronic combat, tanker, and surveillance aircraft) and has placed unanticipated heavy demands on certain support personnel and equipment (especially in the medical, security police, and civil engineering career fields).” [from Effect of Peace Operations on Air Force Combat Readiness, Rand Corporation MR842.] This consortium can partner with Descartes Lab (Santa Fe, NM), a company with the mission to better understand the planet, for good and for profit. In line with the “for good” mission, Descartes Labs’ team of applied scientists also does impact science work around natural disasters, the spread of disease, and food security.

RATIONALE

A Peace Engineering Program entails:

- Ethical innovation and safe deployment of technologies that change human behavior
- Behavioral modification/persuasive technology to promote peaceful behavior
- Data Analytics (ML, AI, etc.) platforms and utilization, predictive and preventative analytics, pattern recognition
- Technologies to support Sustainable Development Goals (SDGs)
- Trans-disciplinary systemic level thinking (unintended social, economic and political consequences of emerging technologies)
- Mitigating and preventing climate change, particularly in those regions where climate change and conflict are inextricably linked (United Nations, World Bank)
- Infrastructure (mobile, internet, labs, utilities, etc.)
- Market signal for the value of peace
- Peace data standard and peace metrics
- Peacebuilding commercialization

The Peace Engineering Consortium includes, but is not limited to:

- | | |
|---|--|
| • University of Colorado—Boulder (CO) | • Ibero-American Science and Technology |
| • Drexel University (PA) | Education Consortium—ISTEC (NM) |
| • Peace Innovation Lab at Stanford (CA) | • Global Innovation Network for Entrepreneurship and |
| • SensorComm Technologies, Inc. (NM) | Technology—GINET, LLC (NM) |
| • Alliance for Peacebuilding (DC/CA) | • Peace Tech Lab (DC) |

DESCRIPTION

A Peace Engineering Consortium shall be authorized within the U.S. Air Force Research Laboratory (AFRL). AFRL is a global technical enterprise, leading the discovery, development, and integration of affordable war-fighting and war mitigating technologies for the U.S. government’s air, space, and cyberspace forces. With a workforce of more than 10,000 across nine technical directorates and 40 other operations across the globe, the Air Force Research Laboratory provides a diverse portfolio of science and technology that ranges from fundamental to advanced research and technology development. In 2018, AFRL joined other leading academic partners, along with Sandia National Laboratories and Los Alamos National Laboratory, in discussing the state of the concept of Peace Engineering and assessing prospects for U.S. investment to help grow and nurture this emerging field.

IMPACT ON UNM/NM/U.S.

The Peace Engineering Consortium (PEC) is comprised of academic institutions, corporations, government institutions, non-profit organizations, and individuals with the focus of applying science and engineering principles for trans-disciplinary systemic-level thinking to directly build peace and support conditions conducive to peace with safe, ethical deployment of emerging technologies. This support will establish the University of New Mexico-led consortium to benefit citizens of the State and the Nation.

Telementoring for Rural STEM Educators

Federal Agency: National Science Foundation (NSF)

Federal Agency Program Office: NSF Division of Education and Human Resources

Current Federal Funding Level: \$57 million

President's FY21 Budget Request: TBD

UNM Contact: Richard Larson, MD, PhD, Executive Vice Chancellor for Health Sciences, 505-272-5102, rlarson@salud.unm.edu

JUSTIFICATION

Given the federal government priority to enhance the capacity and socioeconomic standing of rural communities, particularly via STEM education initiatives, we are requesting that the Delegation support H.R. 4979, a bill aimed at improving rural STEM educator capacity and capability through regional cohorts. In New Mexico, UNM has developed a virtually connected professional learning communities model built around an “all teach, all learn” case-based learning model that includes both research-driven professional development and robust peer/expert mentoring as well as a robust research/evaluation plan process that drives the model. This program would be ideal under a regional cohort envisioned by this legislation.

REQUESTED ACTION

Congress appreciates NSF's desire to expand STEM opportunities to underrepresented communities especially in the areas of educational support to our STEM teachers located in rural communities. Upon passage of the Rural STEM Act, UNM will work with NSF to focus a STEM effort on rural communities by establishing four regional rural STEM education centers tasked with developing data-driven, research-based approaches to improve rural STEM educator professional development. We look forward to working with Congress to support this important initiative.

UNM asks the New Mexico Congressional Delegation to support and cosponsor the Rural STEM Act (H.R. 4979).

BACKGROUND

National, State and Regional/Local data indicate that students, especially girls and minorities, are under-prepared in STEM content areas as well as in 21st century skills when they graduate from high school (low proficiency rates on standardized tests as well as high levels of remediation in math needed upon college entry and anecdotal data from employers who cite that recent high school/college grads are entering the workforce under-prepared). Only 10% of New Mexico 11th graders met or exceeded expectations on the statewide math assessment and only 27% of New Mexico 11th graders met or exceeded expectations on the statewide science assessment. More than 33% of all freshmen require math remediation in order to meet college entrance expectations. New Mexico achievement levels are significantly lower than the national average as measured by the National Assessment of Education Progress. Further, the ACT State of STEM report (2017) indicates that the STEM teacher pipeline is in danger with only 18 students reporting an interest in becoming a math teacher and only nine with an interest in being a science teacher.

RATIONALE

In states with majority-minority populations and/or geographically expansive rural areas with ongoing socioeconomic challenges, rural STEM teachers are in the difficult position of trying to provide high quality educational experiences to student populations under-resourced and underrepresented in STEM fields (females, ethnic/racial minorities, economically challenged) with extremely limited resources and opportunities for professional development, as well as few sustained, meaningful connections to professional networks of other rural STEM educators. Added to these challenges are the difficulties posed by being in geographically isolated areas where the science (STEM) teacher may, in many cases, be the only such educator for students across a range of grade levels and very often does not have access to ongoing, meaningful peer support or high-quality professional development. These teachers are often left feeling isolated and simply doing the

best they can with what they have—or don’t have. The attrition rate for STEM teachers in rural schools across the United States tends to be higher than in urban/suburban schools, which means students are often being taught STEM subjects by unqualified or sorely under-qualified educators (or long term substitutes) because rural districts are often in the position of having to make do with what they can find. Highlighting this is the higher percentage of teachers from high-poverty schools (12%) than from mid-low or low poverty schools (6% each) who moved to other schools between 2011-12 and 2012-13.

DESCRIPTION

In New Mexico, The University of New Mexico has developed a virtually connected professional learning communities model built around an “all teach, all learn” case-based learning model that includes both research-driven professional development and robust peer/expert mentoring as well as a robust research/evaluation plan process that drives the model.

IMPACT ON UNM/NM/U.S.

Many New Mexico students learn in rural districts. A large majority of New Mexico’s 89 school districts and 73 charter schools are classified as rural and are eligible for federal small rural schools funding. New Mexico could be established as an innovator in virtually connected K-12 STEM educator professional learning communities (PLCs) that combine data-driven professional development in the effective implementation of Next Generation Science Standards (or in New Mexico, the STEM Ready Science Standards which encompass NGSS + 6 NM-specific standards), peer/expert mentoring, and case-based learning in an all-teach, all-learn “hub and spokes” model that is virtually connected on a regular, ongoing basis. Establishing these types of PLCs for rural STEM educators will result in lower educator attrition rates as well as increased rural student achievement in math and science as evidenced via higher scores on statewide, standards-based math/science tests.

Nationally, this model for supporting not only the provision of high quality professional development, but also establishing strongly connected professional cohorts will enable pre-college STEM educators, especially those in rural communities, unprecedented access to high quality professional development as well as regular, meaningful, skill/knowledge enhancing participation in effective Communities of Practice delivered in cost-efficient ways that make such support accessible to STEM educators in geographically isolated, economically challenged districts. Each cohort of educators would be tasked with creating classroom-tested lesson/unit plans aligned to Next Generation Science Standards (NGSS)/Common Core State Standards (CCSS) that would become part of an open-source repository of curricular resources accessible to any teacher, anywhere, anytime. The future STEM competitiveness of the U.S. will depend on ensuring a pre-college STEM educator workforce that is well-prepared, adequately resourced, fairly compensated, and has access—regardless of geographic location or financial resources. They would have access to high quality professional development and strong networks of mentors as well as peer support throughout their careers. Providing strong support for rural STEM educators will translate into students who are better prepared in STEM subjects to succeed in post-secondary STEM education and/or careers. These students will require less remediation as they enter college, thus also potentially alleviating the larger financial burden of a longer than usual path to graduation.

Center for Alcoholism, Substance Abuse, and Addictions

The Center on Alcoholism, Substance Abuse and Addictions (CASAA) was established in 1989 and is a category III research center at the University of New Mexico. This is the highest designation for a center at UNM and reflects the importance of the CASAA mission for UNM and the state of New Mexico as well as the scope and scale of CASAA's federally funded research, primarily from the National Institutes of Health.

CASAA investigators embrace multidisciplinary and translational approaches in addressing the full spectrum of substance use challenges facing New Mexico citizens. With an annual budget that ranges between \$5 million and \$7 million supporting 25 grants and contracts, CASAA projects include, but are not limited to, improving school-based prevention programs through social media campaigns, understanding how evidence-based behavioral treatments operate and can be improved with the use of neuroimaging technologies, supporting opiate addicted pregnant mothers to achieve drug-free lifestyles, and reducing recidivism among opiate addicted inmates through medication assisted treatment during incarceration. CASAA faculty are highly productive in disseminating research findings to ameliorate the suffering of substance misuse, averaging about 100 publications per year in leading journals in the United States. CASAA faculty are internationally recognized for training front-line treatment providers in motivational interviewing, for example, and CASAA's prestigious T-32 NIH training program supports the research and academic career trajectories of undergraduate, predoctoral and postdoctoral fellows.

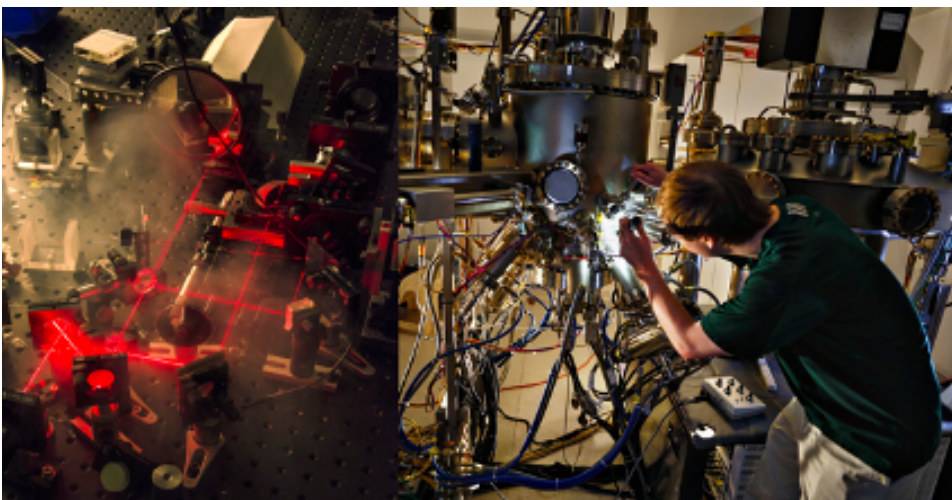


Center for High Technology Materials

The Center for High Technology Materials (CHTM) was established at the University of New Mexico (UNM) as one of five Centers of Technical Excellence (CTE) by the New Mexico legislature and resourced with a \$10 million investment between 1983 and 1988. The late Art Guenther, in his capacity as the Governor's science advisor, was instrumental in shepherding the CTEs through the legislative process. In 1985, Bill Streifer joined UNM as CHTM's first Director and initially set the research focus of the Center on high-power laser diodes. Over the years, under the directorship of Steve Brueck (1986-2013), Sanjay Krishna (2013-2016), and Arash Mafi (2016-present), CHTM has evolved and expanded into an interdisciplinary and internationally recognized center of excellence in optoelectronics, optics, materials science, and microelectronics that boasts a creative and entrepreneurial faculty spanning multiple schools, colleges, and departments.

CHTM actively contributes to the advancement and acceleration of economic development at the state and national levels. According to the UNM Bureau of Economic Development & Research, CHTM maintains a sizable impact on the New Mexico economy. As of 2014, CHTM created 131 jobs in New Mexico on an ongoing basis, \$6.5 million in labor income, and an annual economic impact of \$11.7 million. Between 1983 and 2014, the cumulative total impact in 2014 dollars has been more than \$372 million in economic output, not including more than 550 graduate degrees awarded for research performed at the Center. CHTM faculty and students have created fourteen start-ups and have also been instrumental in helping numerous other small and large businesses in New Mexico. CHTM operates one of the two cleanroom facilities in New Mexico that is available on a fee-for-service basis to small and large businesses. Cleanroom, equipment, or facility users also include federal agencies such as the Air Force Research Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories.

CHTM boasts an interdisciplinary and diverse faculty comprising 17 tenured and tenure-track members spanning the engineering and science disciplines who are engaged in research as well as teaching and mentoring nearly 100 graduate and undergraduate students. Current research activity reflects approximately \$7 million per year and CHTM is building a strategic plan to expand to over \$10 million per year over the next five years.



Center for Water and the Environment

Mission

The mission of the Center for Water and the Environment (CWE) is to conduct cutting-edge research into technological and engineering-based solutions to challenges with water and the environment while also increasing the participation of underrepresented minorities in STEM professions. Practical solutions to problems related to water availability in arid environments and in the presence of climate change and prolonged droughts, and problems associated with energy generation and consumption are particularly relevant to the Center's mission, in light of the criticality of these issues to the state of New Mexico, the southwestern United States, and their global importance.

Primary Research Areas

- *Watersheds*: The impact of watershed management on hydrologic processes and ecosystem services in arid watershed systems, including the impact of forest fires on our water supply, balancing human and ecosystem needs, and increasing resilience of natural and human systems to floods, droughts, and climate change.
- *Treatment Technologies*: Biofilm-based and membrane-based water and wastewater treatment technologies for protecting human health and the environment, reusing wastewater, and treating brackish groundwater.
- *Water and Energy*: Interactions between energy resource development (oil and gas production, uranium mining) and water availability and contamination.

Notable Features and Accomplishments

- \$3.4M in research expenditures in FY 2018/19
- Recently awarded (7/23/19) a National Science Foundation grant from the Centers in Research Excellence in Science and Technology (CREST) program (Phase II) –\$5M over 5 years. This is the second round of funding for CWE from this program.
- Over the past 5 years, the CREST research program has provided funding to support the degrees for 43 graduate students and 27 undergraduate students, with significant participation by under-represented minorities.
- The CWE also houses the Southwest Environmental Finance Center, which provides training and assistance for asset management, water technologies, finance, and management to small utilities and communities, including tribal communities. CWE is also affiliated with the UNM Resilience Institute, the UNM Water Resources Program, and is playing a leading role in the Sustainable Water Resources Grand Challenge.
- CWE researchers and students are working in all regions of New Mexico and with an extensive international network with institutions in Mexico, Switzerland, Chile, The Netherlands, China, and many other countries.



Clinical and Translational Science Center

The vision for the University of New Mexico (UNM) Health Sciences Center (HSC) Clinical and Translational Science Center (CTSC) is to catalyze scientific discovery into improved health by enabling high quality clinical and translational research (CTR)—locally, regionally and nationally. In order to have maximal impact on the HSC and all its missions, the CTSC is not organizationally located in a college or the health system, since it serves as an “umbrella” organization for the entire HSC. Our executive leadership is composed of 16 senior faculty and our chief administrative officer. It directly employs 50-60 staff and provides financial and direct research support to ~300 faculty annually. The grant that supports the CTSC is substantially larger than any other grant at the HSC. The CTSC has also been the most impactful program at the HSC in terms of growing our research mission to national prominence in a broad-based manner, mentoring junior faculty to success, developing new educational and training programs, and launching community collaborations throughout New Mexico. The interface of the research with the clinical mission has also had substantive impact on health care throughout New Mexico and the region.

Non-Fiscal Impacts of the CTSC

The CTSC has led one of the most successful junior faculty recruitment and mentoring programs at UNM. Thirteen junior faculty have been recruited and twelve have obtained extramural funding and became independent principal investigators—a record likely unmatched in the U.S. The CTSC has also supported 1,459 research projects since 2010, bringing the latest state of the art health care to New Mexicans. Approximately, 30 percent of our clinical trial participants come from outside Bernalillo County. The CTSC engages all counties in New Mexico and has clinical trial recruitment and research projects throughout the state. The CTSC also provides needed training to approximately 85 faculty and staff per year. Finally, the CTSC has seven core facilities (i.e. biostatistics, community engagement and research core, community health network, informatics, participant & clinical interactions, regulatory support, and translation and clinical technologies) which provide services to scientists and physicians that would not otherwise be available.

Fiscal Impacts of the CTSC

Although not a measure of health impact, growth in peer-reviewed, extramural funding does indirectly provide a measure of the quantity and quality of research. Since initial CTSA planning under the current PI's leadership, UNM biomedical grant and contract awards increased by 91% over 14 years with a record \$204M in FY17. FY20 is on track to be another record year. This growth occurred during decreased national funding trends, sequestration, and fewer faculty engaged in research nationally. We owe our institutional research growth, in significant part, to the value added by the UNM CTSC. Using a conservative approach to measure only direct fiscal impacts, we have garnered an additional \$140 million in extramural funds that we would not have otherwise due to the CTSC.

Commercialization

UNM also has been successful at forming a regional bioscience business accelerator (ASCEND) in partnership with the CTSC. This newly formed accelerator is designed to build faculty capacity in partnering with start-up businesses and successfully being awarded federal funds (SBIR/STTR).



COSMIAC Research Center

COSMIAC is an Aerospace Engineering Research Center at the University of New Mexico and it serves as a pipeline for engineering talent that also brings academic discipline to support the innovation of national defense technologies. COSMIAC's mission is to provide a dynamic work environment where faculty and students find fulfillment and enjoyment in providing technical engineering solutions for our clients that correlate to ever-changing technologies. COSMIAC's facility provides excellent design capabilities comprising over 29,000 square feet of laboratories, high bay, offices and cleanroom space. All COSMIAC personnel are US citizens with active security clearances (up to TS or Q for DOE).

COSMIAC's focus areas include radiation effects, edge computing in space, advanced GPS, nanosatellite fabrication and integration, communications, additive manufacturing and unmanned aerial systems (drones). A defense-oriented industrial incubator supports the growth of six local start-up companies with capabilities that complement these focus areas. COSMIAC is presently responsible for UNM space products and hosts ground-based facilities for communication with nanosatellites and their variety of payloads, these include a radiation-effects experiment on the international space station. By involving engineering students in these projects, COSMIAC is preparing them to fill the hundreds of openings for cleared engineers in Albuquerque where dynamic change in DoE and DoD sectors has brought tremendous growth.

The threat of delivery of harmful substances by way of a drone is driving the counter-drone activities of the center. Targets for such an attack range from individual people to sporting events or military bases, with commercially available drones varying in size from hand-held to larger than a man, as shown in the image below, and capable of carrying as much as 40 lbs, the potential for disaster is sobering. COSMIAC's growing counter-drone community is studying the possibility to mitigate such attacks by subverting their global position system (GPS) based flight control and navigation systems. COSMIAC engineers have a working relationship with the Air Force Research Laboratories (AFRL) Position, Navigation and Timing (PNT) branch which develops GPS systems. Counter-drone activities are performed in partnership with small business and the Joint Navigation Warfare Center (JNWC). AFRL and JNWC have specific areas of interest related to drones, GPS and PNT for which COSMIAC staff, students and faculty provide support.



UNM Grand Challenges Initiative

Grand Challenges are problems of state and national significance that require researchers to work together across disciplinary boundaries to develop and implement solutions that have a significant positive impact on people and society. In the spring of 2019, The University of New Mexico (UNM) launched the following three Grand Challenges: Sustainable Water Resources, Substance Use Disorders, and Successful Aging. Through the Grand Challenges initiative, UNM will achieve numerous important institutional goals. First and foremost, it will help UNM better focus research expertise to improve the quality of life for all New Mexicans. It will also empower UNM researchers to bring more federal and private research money into the state and will strengthen cross-departmental research collaborations. And by engaging stakeholders throughout New Mexico, the initiative will foster new connections to New Mexico's rural and underserved communities.

The Sustainable Water Resources team is leveraging the size and strength of its interdisciplinary programs in law, policy, natural sciences, social sciences, and engineering to conduct research necessary to help decision makers, communities, and individuals make better choices about how they manage water. The team is committed to the development of a next generation decision platform that will provide policymakers with superior information with which to make decisions. This team has already received more than \$6.5 million in related National Science Foundation funding, including the Long-Term Ecological Research project and the second phase of the CREST Center for Water and the Environment.

The Successful Aging team is focused on researching ways to compress the 'period of disability' for our aging New Mexico population, shifting the threshold of functional status so a person can remain independent longer. As New Mexico's population rapidly ages over the next twenty years, this team is working to expand programs and services for vulnerable populations, support independent living, and create innovative technology to support senior autonomy.

The Substance Use Disorders Grand Challenges utilize multiple research teams to focus broadly on substance use challenges in New Mexico and to more specifically address the state's opioid crisis. These teams work closely together, using a shared approach focused on substance use disorder prevention, treatment and policy. Among their many goals, these teams are working to change perceptions of substance use to improve prevention and/or to provide access to treatment for substance use and addiction, and to build resilience in communities to prevent opioid and substance misuse. Given the recent and large investment by federal agencies in substance and opioid misuse, our teams are already successfully competing for this funding. This team has already received more than \$5 million in federal research funding, including four awards/subawards from the National Institutes of Health.

Modern and new facilities are critical for continued growth of the Grand Challenges and our research enterprise. Making federal funds available for states like New Mexico to construct new, state-of-the-art research facilities is, therefore, one of our priorities this year. It is also important that publicly-funded research lead to discovery that improves our lives, grows the economy, and creates jobs. UNM leads a regional network (ASCEND) of university research hubs tasked with facilitating faculty interaction with commercial businesses.

Grand Challenges

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