



NATIONAL STRATEGIC RESEARCH INSTITUTE
at the University of Nebraska

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THREE NATIONAL NSRI LOCATIONS:

NSRI AT THE UNIVERSITY OF NEBRASKA

mailing address:
984238 Nebraska Medical Center
Omaha, NE 68198-4238

physical location:
3925 Dewey Avenue
Omaha, NE 68105-1110

NSRI AT U.S. STRATEGIC COMMAND

U.S. Strategic Command Headquarters
Offutt Air Force Base, Nebraska

NSRI NATIONAL CAPITAL REGION (NCRI) FIELD OFFICE

9070 Junction Drive, Suite F
Annapolis Junction, MD 20701-1141

info@nsri.nebraska.edu
<https://nsri.nebraska.edu/>

On November 12, 2016, the University of Nebraska hosted the annual Huskers Military and Veterans' Recognition game. NU President Hank Bounds (left) hosted top leaders from USSTRATCOM, including new commander, General John Hyten (2nd from left). Other special guests included NSRI Executive Director Lt. General (Ret.) Bob Hinson (3rd from left), who was recognized on the field with General John Hyten for being an outstanding NU partner. Others hosted included UNO researcher Dr. Gina Ligon and State Senator Jim Smith. Nebraska beat Minnesota 24 to 17! Pictured on the right is Shawn Eichorst, Director of Athletics, University of Nebraska-Lincoln.



This year our dear friend, colleague, and NSRI board member, Dr. Prem S. Paul, lost his battle against cancer. Prem

began his tenure as Vice Chancellor for Research and Dean of Graduate Studies at the University of Nebraska in 2001. In 2012, his vision and determination led the University efforts in responding to the United States

Strategic Command (USSTRATCOM) requirements for our University Affiliated Research Center (UARC). To say that Prem was passionate about the University research programs contributing to the U.S. National Security responsibilities would be a gross understatement. He was enormously proud of the University's contributions to the mission responsibilities of USSTRATCOM and the broader Department of Defense.

In our 2016 Annual Report, we pay special tribute to Dr. Prem S. Paul, for his leadership and trailblazing determination to do more, better and faster. He will be remembered and missed!

In our 2015 annual report, I suggested that getting our research scientist into the "foxhole" was instrumental to a better understanding of warfighter requirements and delivering solutions that meet their many needs. In 2016, we expanded our research portfolio to take on a broader set of sponsors and their requirements, while deliberately developing our strategic plan toward refining our research initiatives through a better understanding of sponsor requirements, our strengths as a research institute, and investments in nationally recognized researchers. One new initiative incorporates a focused collection of training activities, designed to bring researchers and operational personnel together, fostering greater interaction between our scientists and the operators. Our 2016 report demonstrates our success this year and provides evidence of the positive impact on national security by our University researchers, students, post-docs, and faculty.



Over the past three years, Admiral Cecil Haney, previous Commander, USSTRATCOM, served as a principal advocate for the command's UARC saying "NSRI at the University of Nebraska in partnership with the U.S. Strategic Command and Department of Defense is providing our nation with cutting edge mission-essential research and development capabilities in combatting weapons of mass destruction." In November 2016, General John Hyten took command at USSTRATCOM, offering

his continued advocacy for working with academia. He emphasized the continued Strategic Command support for combating weapons of mass destruction (CWMD) research, the need to move fast enough to stay ahead of our adversaries, and the need for academic insight to increase the effectiveness of our mission capabilities.

In November 2016, the President's Council of Advisors on Science and Technology (PCAST), reported their particular concerns for the biological threat by saying in part:

"In the best case, a biological attack would be prevented through enhanced threat awareness and deterrence and/or interdiction. However, it is possible that a well-planned, well-executed attack might go unnoticed for days or weeks. The ability of the United States to escape serious consequences will depend on effective detection (biosurveillance), response (such as medical countermeasures), and recovery capabilities."

These kinds of reports reinforce the significance of the research required to stay ahead of our potential adversaries, to deliver enhanced technologies and training to support mission readiness, and to invest in the next generation of scientist to do more, faster and better, so that our national security is never compromised by surprise attacks regardless of their origin.

Robert C. Hinson

Robert Hinson, USAF, Lt Gen (Ret.)
NSRI Executive Director

IN MEMORIAM

Dr. Prem S. Paul

UNL Vice Chancellor for Research and Economic Development
1947 - 2016



Dr. Prem Paul served as one of the founding members of the NSRI board of directors. He was very instrumental in the establishment of the nation's newest University Affiliated Research Center. The NSRI was stood up with a passionate vision, thanks in part to his leadership.

Prem's guidance transformed the NSRI and influenced its progressive direction. Prem was affectionately known across the University of Nebraska-Lincoln campus as the Vice Chancellor for Enthusiasm. "If we can win national championships in football and volleyball, why not in research," said Paul.

Under Paul's leadership, the university was one of the fastest-growing research universities in the nation from 2001 to 2009. Research funding surpassed \$100 million in 2006, marking the first time the university's external funding reached that milestone. Most recently, sponsored campus research in the fiscal year ending June 30 increased more than 23 percent from the previous year, setting an all-time university record of \$267.8 million.

"Thanks to Prem's vision and leadership, our contributions to CWMD research have transformed us as a UARC. Prem's impact on the NSRI cannot be overstated," said NSRI Executive Director, Lt. Gen. (Ret.) Robert Hinson.

The NSRI honors the accomplishments, advancements and life of Dr. Prem Paul, NSRI board member and innovative leader. His legacy will continue through the upward growth of our institute and the University of Nebraska.

A memorial fund honoring Prem Paul has been established at the University of Nebraska Foundation. Donations may be sent to:

Prem S. Paul Fund for Research Excellence
University of Nebraska Foundation
1010 Lincoln Mall
Lincoln, NE 68508
Phone: 800-432-3216

NSRI RESEARCH ACCOMPLISHMENTS

PROGRESS



“The National Strategic Research Institute is only a few years old and already it is a success story for our university and state. Nebraskans might be surprised to learn that some of the most important national security research in the country is happening in their own backyard. We have great opportunities ahead—a credit to capable NSRI leadership and, most of all, the faculty whose expertise and commitment make an ambitious effort like this possible.”

Hank Bounds, Ph.D.
President, University of Nebraska



“The adversaries and potential adversaries and challenges we face in the 21st century have global ramifications. Partners like the National Strategic Research Institute make sure we think about those challenges every day and make sure we’re doing business the right way. The collective intellect and legal expertise they have assembled, whether they work for the military, academia or industry are essential to that effort.”

Gen. John E. Hyten
Commander, USSTRATCOM



In 2016, the U.S. Department of State selected NSRI to help support the demonstration of the U.S. government's state-of-the-art Contained Bio-containment System (CBCS), used to transport critically ill patients by air, in complete isolation. The exercise took place across four locations including Washington, D.C., Carterville, Georgia, Monrovia, Liberia, and Omaha, Nebraska.

FROM THE CHIEF TECHNOLOGY OFFICER

Eric Van Gieson, Ph.D.



The challenges that our Nation faces from asymmetric and technological threats has eclipsed our ability to develop technology solutions to mitigate those threats. In response to this, the Defense Innovation Board (established under the Office of the Secretary of Defense) has been formed and has recently made a set of recommendations in October of 2016 to include “increase investment in the Defense Advanced Research Projects Agency, the Strategic Capabilities Office, the Defense Innovation Unit Experimental, rapid equipping units and other small, agile, innovative organizations and create more connections among them.” NSRI fits into the small, agile, innovative category of organizations, and in 2016 our team has worked intensely to make our organization even more responsive in all of those categories.

In the past year NSRI has, in the words of one of our board members, reached “escape velocity”. This term suggests that the level of impact and the scope of work that NSRI has accomplished now makes NSRI an instantly recognized technology and research contributor across the military and government community. This achievement has not been without significant effort by University of Nebraska (NU), NSRI leadership and the technical team to ensure that clear research initiatives and technical development efforts were created and executed for our strategic partners.

When I was brought into the NSRI team, the mission placed in front of me was to leverage the University faculty and staff to partner with NSRI to develop even more of a positive impact on countering WMD. This was an exciting challenge and immediately our team worked together to develop a set of near-term and long-term research initiatives that would capitalize on the current strengths of the University. The long-term initiatives would represent stretch goals that would challenge the University community to integrate existing capabilities or

develop entirely new capabilities. With each of the new initiatives, we have sought to balance the abilities that we possess at NSRI and NU with the needs and available resources of our sponsors and end users. Additionally, the initiatives have formed the backbone of our strategic plan and have ultimately allowed our entire organization to focus the limited resources on efforts that we feel can provide the most benefit to the WMD fight.

As we execute our strategic plan, NSRI hopes to serve as an “integrating function,” across the various departments of the NU community by linking researchers and departments together to accomplish common goals. NSRI staff have worked hard to unify and build teams across the campuses through programs such as STRAT Fellows, the Drug Development Pipeline, and the readiness exercises that we are conducting with various groups of operational military or civil defense personnel. It is important to emphasize that NSRI's drive for technology development always has the goal of leveraging the broad capabilities of NU which, in many cases, requires NSRI to unite teams across the campuses.

As the threat changes and as our sponsor/user needs change, NSRI intends to remain agile and will evolve our list of strategic research initiatives with the input of sponsors, end-users and the NU campuses. It is through this constantly evolving set of needs from the military and civilian forces that NSRI can work with NU to develop new capabilities or amplify existing strengths through diverse capital and staff investments.

I am extremely excited to be working with such a talented, committed team and am highly impressed with how well the University partnerships have evolved even in the short time that I have been a part of NSRI. I can't wait to see how much more we can accomplish in the next year and we intend to exceed expectations with our innovative solutions to difficult problems.

**TOTAL AMOUNT
AWARDED IN 2016:**

\$18.3M

**TOTAL AMOUNT
AWARDED SINCE
2012:**

\$42.5M

NSRI research is aligned with the mission of the United States Strategic Command (USSTRATCOM) to combat weapons of mass destruction and their impact on strategic deterrence. Our research includes many other areas critical to national security, including fighting infectious disease, defeating terrorism and protecting our men and women in uniform. More than 40 faculty and 60 students in multiple disciplines across the University of Nebraska campuses have engaged with NSRI, resulting in new partnerships with other universities.

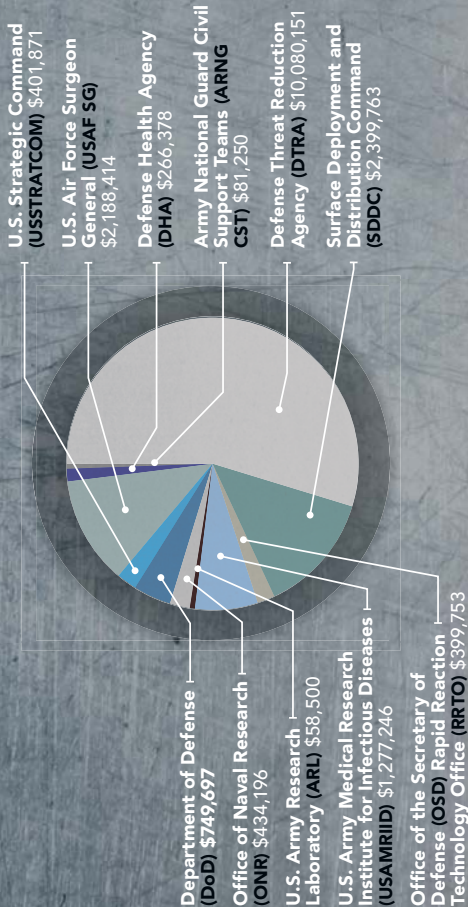
Continued funded research by our sponsors is a primary metric by which NSRI measures success.

**69% of the Principal
Investigators on new projects
in FY16 have completed
previous research through
NSRI**

**60% of projects awarded
in FY16 were continuations
of previous NSRI-awarded
research projects**

\$18.3M

AWARD BY CUSTOMER 2016



\$42.5M

RESEARCH AWARDS 2013-2016



60 TOTAL

NUMBER OF TASK ORDERS, CONTRACTS, & GRANTS 2012-2016

NSRI is sponsored by USSTRATCOM and receives funding on specific projects from USSTRATCOM and other DoD agencies through task orders on a pre-competed Indefinite-Delivery Indefinite-Quantity (IDIQ) contract. This contract allows funds to be received and quickly tasked for execution. Since this IDIQ contract has been pre-competed in a set of core competency areas, it allows government agency sponsors to award projects in those competencies without going through an additional bidding process. NSRI may also compete for additional science and technology work through other contractual mechanisms where appropriate.

- U.S. Strategic Command (USSTRATCOM)
- Army National Guard Civil Support Teams (ARNG CST)
- Defense Health Agency (DHA)
- Defense Threat Reduction Agency (DTRA)
- Department of Defense (DoD), other
- Department of Homeland Security (DHS)
- Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD)
- Landstuhl Regional Medical Center (LRMC)
- National Nuclear Security Administration (NNSA)
- Office of Naval Research (ONR)
- Office of the Secretary of Defense, Rapid Reduction Technology Office (OSD) (RRTTO)
- Surface Deployment and Distribution Command (SDDC)
- U.S. Air Force Office of the Surgeon General (USAF SG)
- U.S. Air Force School of Aerospace Medicine (USAFSAM)
- U.S. Army Corps of Engineers (USACE)
- U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID)
- U.S. Army Research Laboratory (ARL)



TOP 5 LARGEST NSRI SPONSORS IN 2016

1	DEFENSE THREAT REDUCTION AGENCY (OTRA) \$10,000,151 International Biological Field Support & International Next Generation Sequencing Training PI: Dylan Cunningham, NSRI CO-PI: Dr. Marilyn Larson, University of Nebraska Medical Center CO-PI: Dr. Mike Wiley, University of Nebraska Medical Center Assessing the Benefits and Burdens of Nuclear Latency PI: Dr. Rupal Mehta, University of Nebraska-Lincoln	2	U.S. ARMY MILITARY SURFACE DEPLOYMENT & DISTRIBUTION COMMAND (ISDDC) \$2,399,763 Traffic Calming Elements for Entry Control Facility Threat Delay and Containment PI: Dr. Larry Rilett, Nebraska Transportation Center, University of Nebraska-Lincoln	3	U.S. AIR FORCE SURGEON GENERAL OFFICE (USAF SG) \$2,188,414 Microbubble Oxygenation for Emergency Transport PI: Dr. Keely Buesing, University of Nebraska Medical Center CO-PI: Dr. Benjamin Terry, University of Nebraska-Lincoln CO-PI: Dr. Mark Borden, University of Colorado Boulder	4	U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES (USAMRIID) \$1,277,246 Target Enrichment Studies Furthering Capabilities in Countering Emerging Biological Threats PI: Dr. Mike Wiley, University of Nebraska Medical Center	5	DEPARTMENT OF DEFENSE (DOD) \$749,697 Cyberbiosecurity PI: Dr. Randall Murch, Virginia Tech CO-PI: Dr. Wally Buchholz, University of Nebraska-Lincoln CO-PI: Dr. Jean Peccoud, Colorado State University
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HUMAN CAPITAL

DEVELOPING AND MAINTAINING THE CWMD WORKFORCE

COMBATTING WEAPONS OF MASS DESTRUCTION

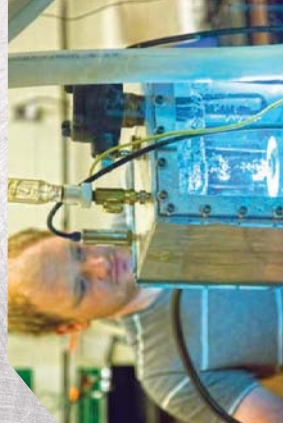
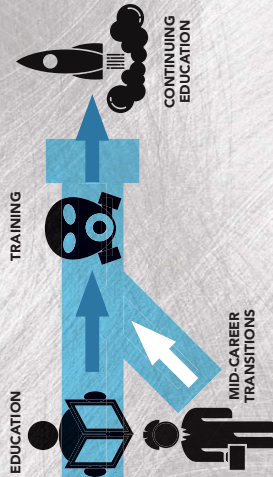
NSRI is developing solutions that involve strategic, technological, and human capital initiatives working together toward a common goal: to develop and maintain an adaptable, intelligent, and responsive human capital pipeline that will enable the future CWMD mission.

NSRI is committed to the recruitment and education of new human capital. Throughout 2016, NSRI employed over 60 undergraduate and graduate students on CWMD research projects including placement of interns at USAMRIID.



NSRI is charged with continuing education initiatives to maintain and retain a passionate CWMD workforce. NSRI sponsors the Strategic Leadership Fellows Program which provides continuing graduate-level education for USSTRATCOM civilian employees

As we move to the future, NSRI will continue to develop programs for strengthening the human capital pipeline including working with Air Force Global Strike Command to provide education for the nuclear enterprise workforce.



NSRI is dedicated to the training of current workforce and mid-career transitions to ensure they are ready for the mission. Throughout 2016, NSRI has conducted multi-discipline programs and training for Army National Guard Civil Support Teams, government agencies, law enforcement, public health and first responder personnel across the nation.



STRATEGIC LEADERSHIP FELLOWS PROGRAM

USSTRATCOM STRATEGIC LEADER FELLOWS SINCE 2013

NSRI, University of Nebraska at Omaha and U.S. Strategic Command launched the Strategic Leadership Fellows Program in March 2014 as a first-of-its-kind initiative under the NSRI, a UARC dedicated to delivering solutions for Combating Weapons of Mass Destruction (CWMD). The program includes classroom-based and hands-on learning opportunities to provide graduate-level leadership development to civilian leaders within USSTRATCOM.

"This Program has become an important part of developing our workforce to better understand the challenges and create innovative approaches for 21st century deterrence in an extremely complex global security environment. We began this graduate fellowship program with the University of Nebraska at Omaha two years ago, and it continues to make a positive difference."

-Cecil D. Haney, U.S. Navy Adm., previous USSTRATCOM commander

"The USSTRATCOM Fellows program provided me a diverse network of experts in academia, the business sector, in the government sector, and across USSTRATCOM that I constantly leverage to develop more effective and efficient national security options for the Commander of USSTRATCOM. This experience provided the stimulus for greater collaboration across the organization by creating these collaborative-friendly pockets."

-Dan Lewis, Strategic Leadership Fellows Program Graduate, 2016



U.S. Navy Adm. Cecil D. Haney (center), U.S. Strategic Command (USSTRATCOM) previous commander, speaks to Dr. John Christensen (left), University of Nebraska at Omaha (UNO) chancellor, and Dr. Louis Pol, Dean of UNO's College of Business Administration, during his arrival at the USSTRATCOM Leader Fellowship Program.

(Below) Dean's Welcome by Dr. Hesham Ali, Dean, College of Information Science and Technology, University of Nebraska at Omaha.

(Below) Dr. Bill Mahoney, Associate Professor, Cybersecurity, University of Nebraska at Omaha (UNO) (left), U.S. Air Force Lt. Gen. Stephen W. Wilson, previous U.S. Strategic Command (USSTRATCOM) deputy commander (center); and Dr. John Christensen, UNO Chancellor (right); observe a demonstration on the Industrial Control Systems (ICS) Resiliency Education Project at the Peter Kiewit Institute, Omaha, Neb., April 22, 2016.



RESEARCHER RECOGNITION AWARDS

2016 NSRI DISTINGUISHED SCIENTIST AWARDS:

For significance of research performed, performance feedback from research sponsors and repeat projects as a result of research findings and potential.



Dr. Dennis Alexander
Kingery Professor of Electrical Engineering, the head of the Laser Science and Engineering Research (LaSER Lab), and the director of the Center for Electro-Optics and Functionalized Surfaces (CEFS), at UNL.

Dr. Wally Buchholz

Professor and Director of the Biological Process Development Facility at UNL



Dr. Jim Talmadge

Professor in Pathology and Microbiology at UNMC



2016 NSRI RESEARCH LEADERSHIP AWARD:

For serving as a champion to colleagues and talented scholars, mentoring new students, building a research team of sufficient scale and tackling distinctive research problem(s) through research that significantly changes the landscape in the CWMD field.



Dr. Doug Derrick

Professor of Management at UNO.

2016 NSRI EXCEPTIONAL UNDERGRADUATE RESEARCH STUDENT AWARD:

For recognition of an undergraduate student who has completed outstanding research, scholarship or creative activity tied to any CWMD mission area subject while at the University of Nebraska.



Mr. Gary Roth

Roth is Pursuing a Bachelor of Science degree in computer and information systems at UNO.

2016 NSRI EXCEPTIONAL POST-DOCTORAL RESEARCH AWARD:

For recognition of a postdoctoral scholar who has shown exceptional promise that may include excellence in CWMD research, leadership, advocacy, outreach or teaching, during their postdoc assignment at the University of Nebraska.



Dr. Craig Zuhlike

Research Assistant Professor in Electrical Engineering at UNL

2016 NSRI EXCEPTIONAL CONTRIBUTOR AWARDS:

For impact of service, effectiveness of core values, innovation toward operations and significance to the successes of the NSRI.



Mr. Dillan Cunningham

Director of CBRNE Counterproliferation and Defeat, NSRI



Ms. Stephanie Smith

Executive Assistant to NSRI Executive Director

2016 NSRI TEAM EXCELLENCE AWARD:

For teamwork across NSRI collaborative efforts and support of the NSRI's UARC sponsor, USSTRATCOM.

USSTRATCOM Strategic Leadership Fellows Program

"Without our research superstars across the University of Nebraska, none of our successes would be possible. Our research scientists promote the research capabilities of the University of Nebraska and directly contribute to the missions supporting our national security and the readiness of our military personnel."

- Robert Hinson, Lt Gen (Ret)
NSRI Executive Director



2016 NSRI Team Excellence Award recipients

Pictured from left to right are

Retired Air Force Lt. Gen. **Robert Hinson**, NSRI Executive Director; **Mr. Michael Mazgal**, Strategic Leadership Fellows Program Graduate Assistant (2016-2017); **Dr. Ken Bayles**, Associate Vice Chancellor for Basic Science Research & Vice Chair and Professor in the Department of Pathology and Microbiology at UNMC; **Dr. Gina Ligon**, Associate Professor of Management at UNO; **Dr. John Christensen**, UNO Chancellor; **Ms. Rebecca Lair**, USSTRATCOM Strategic Leadership Fellows Program Coordinator; **Mr. Don Durallia**, Deputy Chief of Workforce Development at USSTRATCOM; **Dr. Jody Neathery-Castro**, UNO Political Science Chairperson; **Dr. Ramazan Kilinc**, Political Science Associate Professor at UNO; **Dr. Sharon Medcalf**, Assistant Professor of Department of Health Promotion, Social, and Behavioral Health & Director of Center for Bioscience, Biopreparedness and Emerging Infectious Diseases at UNMC and **Mr. Todd Saylor**, Chief of Workforce Development at USSTRATCOM.

Not pictured are

Mr. Caleb Steffensmeier – Graduate Assistant (2015-2016); **Ms. Alicia Andry** – Assistant Director of Admissions & Academic Services; **Mr. David Nielsen** – Assistant Dean of College of Business; **Dr. Mario Scalora**, **Dr. Doug Derrick**, Associate Professor of IT Innovation and UNO and Program Lead; **Dr. Chris Diller** – Fellows Program Instructor; **Dr. Pete Simi**, **Dr. Roni Reiter-Palmon**, **Dr. Patrick McNamara**, **Dr. Joe Allen**, **Dr. Robin Gandhi**, **Dr. Matt Hale**, **Dr. Mark Scherer**, **Dr. Ann Fruhling**, **Dr. Erin Peiggenkuhle-Miles**, **Dr. Elizabeth Chalecki**, **Dr. Lynn Harland**, **Dr. Leif Lundmark**, **Dr. Erin Bass**, **Dr. Jody Neathery-Castro**, **Dr. Lana Obradovic**, **Dr. Tatyana Novikova**, **Dr. Abhishek Parakh**, **Dr. Kerry Ward**, **Dr. Noel Palmer**, **Mr. Kenneth Knotts**

PROFESSIONAL EDUCATION IMPACT:

GROWING THE NEXT GENERATION

An expectation of NSRI as a UARC is to mentor and grow young talent to participate in future DoD research, pursue advanced degrees, or seek a career with the Government in fields related to CWMD.

At the NSRI, both undergraduate and graduate students have the ability to participate in groundbreaking research. Students work on tech, bio and science-related awards, building the nation's much-needed Science Technology Engineering Math (STEM) pool. Working with top researchers prepares students for internships and employment within the DoD and other agencies.

BIODEFENSE RESEARCH EDUCATION PIPELINE (BREP)

PROGRAM OVERVIEW

To provide a pool of talented young scientists who are prepared to join the DoD workforce, the NSRI and the University of Nebraska are working to develop a BioDefense Research Education Pipeline (BREP) that specifically focuses on the training of individuals in the use of modern technologies critical for infectious disease research. Partnering with the Institutional Development Award Program (IDeA) Networks of Biomedical Research Excellence (INBRE) program in Nebraska, which boasts one of the highest success rates for mentoring students into biomedical research graduate programs, the NSRI is developing an unprecedented educational pipeline involving UNMC, UNO and USAMRIID. The BREP program specifically targets both undergraduate and graduate students who are qualified to join the fight against infectious diseases and largely driven by research projects that are of interest to the DoD. The BREP program offers hands-on experiences in laboratories conducting DoD-related research.

BREP UNDERGRADUATE TRAINING

- + Recruit sophomores and require two-year commitment
- + Integration of the undergrads into mentor research programs, with projects relevant to DoD interests where possible
- + Genomics focus initially, but proteomic and metabolomics projects to follow; other research areas considered include pharmacological and drug development-related projects
- + BREP undergrads work at Ft. Detrick in the summer



Maggie Bartlett is a UNMC student studying Immunology, Pathology, and Infectious Disease (PID) in the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS) program. Bartlett was the first student to participate in the NSRI BioDefense Research Education Pipeline (BREP) program at the United States Army Medical Research Institute of Infectious Diseases (USAMRIID) over the summer of 2016.

Bartlett said "My focus was learning about the application of immunomics; a process which characterizes the immune response to vaccinations and infections utilizing high-throughput sequencing. During my rotation at USAMRIID, we described the B cell repertoire longitudinal response to a VSV-EBOV-GP vaccine administered IM in non-human primates (cynomolgus macaques) and human volunteers, examined the epitopes recognized by the humoral response (IgM and IgG), and worked on isolation and characterization of the T cell response to the same vaccine. The application of the immunomics tools allowed me to describe the humoral and cellular immune response to the VSV-EBOV-GP vaccine."

BREP GRADUATE EDUCATION

- + Research mentors at UNMC
- + BREP students associated with the INBRE program have their stipends paid by INBRE in the first year of the program
- + BREP students take foundational classes at UNMC; first year would need to be in Omaha, but second year could be taken remotely
- + After the first year, the students could either begin their research activities in a bio-defense lab at UNMC, or transfer to USAMRIID to work with UNMC faculty who are based there
- + BREP students would be required to submit UNMC fellowship proposals and then an NIH fellowship application to cover the duration of their graduate education

RESEARCH IMPACT

Operation Tranquil Surge: Highly Infectious Disease Full-Scale Exercise

In 2016, the U.S. Department of State selected the National Strategic Research Institute at the University of Nebraska (NSRI) to help facilitate the demonstration of the U.S. government's state-of-the-art Containerized Bio-containment System (CBCS) used to facilitate the air transport of critically ill patients who need to be completely isolated from others. The event took place during an exercise, titled Tranquil Surge.

The drill was conducted as a series of four exercises to demonstrate and test the CBCS capability. NSRI supported the exercise from start to finish, across four locations including Washington, D.C.; Cartersville, Georgia; Monrovia, Liberia; and Omaha, Nebraska.

ALL HAZARDS RESPONSE TRAINING (AHRT)

NSR's All Hazards Response Training (AHRT) is the only program combining the best CWMD academic research in the nation with the strength of seasoned chemical, biological, radiological, nuclear and explosive (CBRNE) industry talent. NSRI's AHRT team can design almost any training and education around specific mission requirements and objectives.

The mission of protecting warfighters and emergency responders is in the crosshairs of research efforts at the NSRI. From the laboratory to the field, the NSRI is bridging the CWMD mission space.

"Being able to collaborate, plan and execute such a large-scale event in the Los Angeles area is no easy task. Despite this, the NSRI team was able to craft an event that challenged each agency's approach to a WMD incident, highlighting the fact that the 9th CST is ready, willing and able to conduct complex entry and sampling operations in support of local, state and federal response partners."

- US Government Client, 2016 AHRT National Level Exercise

NSRI personnel use multi-discipline programs to provide CBRNE training scenarios across the nation and internationally, using actual or simulated environments inside operational facilities, orchestrated by a cadre of subject matter experts. NSRI's precision in AHRT National Level Exercises (NLEs) improves the CWMD preparedness of government agencies, law enforcement, public health and first responder personnel.

Established primarily to increase collaboration between Civil Support Teams (CSTs) and their local, state and federal assets that would normally respond to an act of terrorism in their home states.

Participating agencies benefit through improving communication and increasing cooperation between agencies while decreasing the number of non-credible samples collected by the responding agency.

Throughout 2016, NSRI AHRT instructors provided multi-discipline training, exercise venue and guidance on all aspects of CWMD response for over 60 agencies and over 500 personnel across the nation.



RESEARCH

- Encourage NU/NSRI faculty and researchers to explore how wargaming can be used as a research tool that can help test research theories and their underlying assumptions
- Explore novel, interdisciplinary approaches for decision making, crisis management, deterrence, and solving complex problems
- Enhance the art and science behind wargaming to develop more immersive environments that engage participants and allow for more flexible player inputs that drive realistic responses from the game environment and other players



A DIFFERENT PERSPECTIVE TO WARGAMING

Uniquely situated between CWMD academic research and Department of Defense sponsors, the NSRI has initiated an Academic Wargaming Center to provide NU/NSRI faculty and researchers with a cutting-edge tool to investigate processes, organize ideas, explore issues, highlight consequences of decisions and identify future research opportunities in the CWMD mission area. This tool will provide CWMD sponsors with the means to engage academia and private industry on real-world problems of national security interest. As an academic tool, wargames can help students gain understanding of decision-making complexities through experiential learning, explain how and why events unfold, and explore unknowns through role-based discovery.

Academic Wargaming, which ranges from complex, multi-sided computer-assisted games to more fundamental, single-sided seminar games, can address issues from a number of areas, including homeland security, defense, space, cyber, command and control, and interagency coordination. Insights gained from wargames can provide stakeholders with information and understanding that will assist in future decision making and policy-related issues.



ACADEMIC WARGAMING MISSION OBJECTIVES

EDUCATION & TRAINING

- Build mutual trust and understanding between the academic and military communities, especially those that align with the National Strategic Research Institute's (NSRI's) core competencies
- Expose University of Nebraska (NU) faculty and students to wargaming concepts that build capacity in decision making, critical thinking, and creative problem solving
- Develop innovative wargaming tools and concepts to provide more experiential learning opportunities in the classroom

FACILITY DEVELOPMENT

Provide resources and facilities for wargaming events, including interactive seminars, rehearsal of concept exercises, table-top exercises, and simulations at NSRI's Nebraska and Maryland facilities

PROGRESSION

FROM THE HEART OF THE MIDWEST TO THE NATION'S CAPITAL

NSRI and the University of Nebraska expand footprint with National Capital Region Field Office

In 2016, the NSRI announced the opening of its new National Capital Region (NCR) Field Office, in support with the University of Nebraska. The National Capital Region Office will provide digital connectivity to collaborative centers in Nebraska, enabling University of Nebraska faculty and staff to interact with sponsors and collaborators in the National Capital Region.

With this facility, the NSRI and NU are expanding their national footprint and industry-leader recognition as a UARC, while growing across multiple, national locations. The NCR field office provides a strong foundation for engaging Department of Defense (DoD) and other Government agencies that are looking for solutions to reach the demands of national security threats. The rapid growth of both staff and physical facilities within the NSRI further increases UARC capabilities for providing expanded research & development services thereby increasing the impact of the NSRI and NU missions.

NU President Hank Bounds stated that "the University of Nebraska is dedicated to research in a broad range of disciplines and service to not only our state's citizens, but the citizens of the nation and the world. Our NSRI and NU presence in the nation's capital area will be a catalyst to further research at Nebraska and expand the university's research mission among collaborations with federal agencies, businesses nationwide and across other institutions of higher education."

Lt. Gen. (Ret) Bob Hinson, Executive Director of the NSRI expanded, "our NSRI Washington DC-based staff are truly human capital assets who possess hybrid skill sets. Having them on board in our new facility results in an evolving service for NSRI, offering enhanced solutions across all of NSRI's competencies. A state-of-the-art facility and the leadership of the sharp minds working there will be key to driving agency relations and furthering research solutions for combating weapons of mass destruction at the University of Nebraska, for USSTRATCOM, the DoD and the nation."



FEATURED NSRI AND UNIVERSITY OF NEBRASKA RESEARCH PROJECTS IN THE CWMD MISSION

RESEARCH PROJECT

Traffic Calming System Design

CORE COMPETENCY

Consequence Management

RECOGNIZED IMPACT

United States Transportation Command (USTRANSCOM) required research to conduct physical testing and modeling and provide design recommendations for the modified MGS system for passive barrier use at Entry Control Facilities.



RESEARCH PROJECT

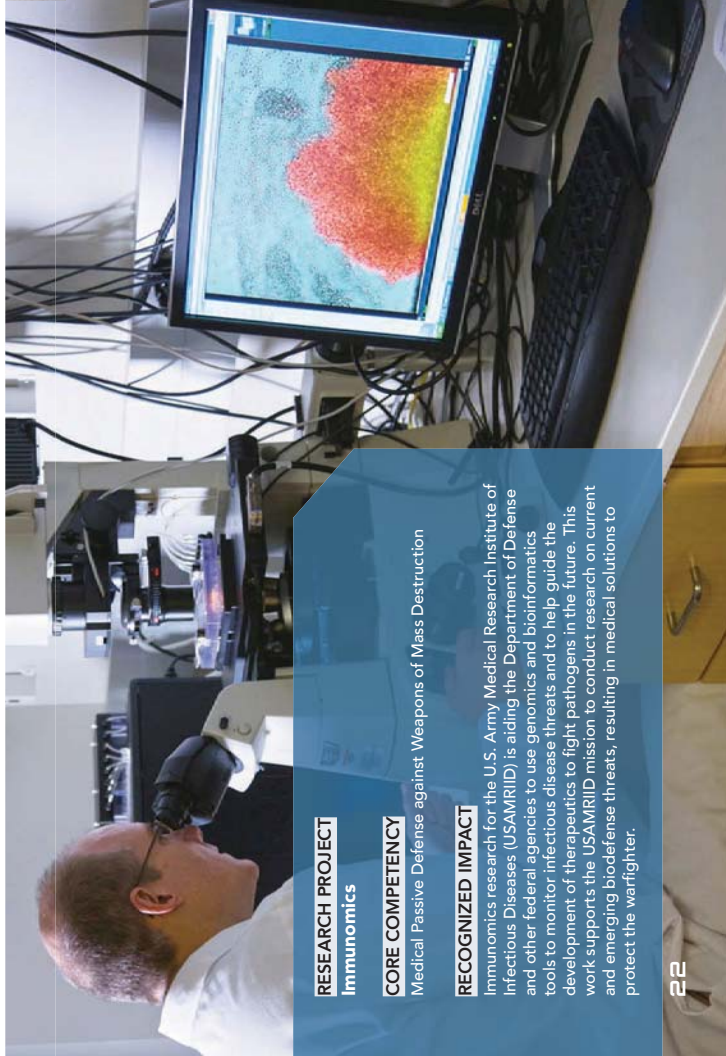
Immunomics

CORE COMPETENCY

Medical Passive Defense against Weapons of Mass Destruction

RECOGNIZED IMPACT

Immunomics research for the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) is aiding the Department of Defense and other federal agencies to use genomics and bioinformatics tools to monitor infectious disease threats and to help guide the development of therapeutics to fight pathogens in the future. This work supports the USAMRIID mission to conduct research on current and emerging biothreats, resulting in medical solutions to protect the warfighter.



RESEARCH PROJECT

Extreme Light Laboratory: Laser-driven Variable Energy X-Ray Source

CORE COMPETENCY

Nuclear Detection and Forensics

RECOGNIZED IMPACT

New X-ray source to conduct nuclear and chemical compound detection and forensics that produces a high intensity focused beam using a dramatically smaller technology footprint and power requirements. New design offers potential for ground and air mobile high energy beam sources.



RESEARCH PROJECT

The Femtosecond Laser Surface Processing

CORE COMPETENCY

Consequence Management

RECOGNIZED IMPACT

Produce materials with new desirable properties:
• Increased heat transfer for high-temperature energy systems

• New heat pipe technologies

• Reduction in growth of bacteria on surfaces

• Surgical implants

• Low drag projectiles in water
• Materials which are virtually invisible to visible, infrared, and UV light

• Medical supplies that cannot be contaminated by blood or other fluids



2016 RESEARCH PROJECTS:

Research being conducted through NSRI by researchers across the University of Nebraska includes development of a system that can detect nuclear materials hidden within more than a foot of steel, development of vaccines for infectious diseases like Ebola and anthrax, identifying novel treatments for exposure to neurotoxins and engineering systems to defend military installations from weapons of mass destruction; and the study of the psychology of terrorist groups like ISIS. These and other areas—including combating emerging and persistent threats to the United States and its allies, like chemical, biological, radiological and nuclear weapons—mean NSRI's work is timely and relevant.

RESEARCH FOCUS AREAS

Deterrence and Dissuasion
Nuclear, Chemical, and Biological Weapon Proliferation
CBRN Threat and Vulnerability Assessment
Detection of Nuclear and Radiological Materials
Detection of Chemical and Biological Agents
Interdiction of CBRN Threats
Nuclear Explosion Monitoring
Biosurveillance
Bioinformatics and Epidemiology
Antibiotics, Antiviral Drugs, and Vaccine Development
Medical Innovations against WMD Threats
Emergency Response to Nuclear, Radiological, Chemical and Biological Events
Remediation of Biological, Chemical, and Radiological Contamination
Nuclear Forensics and Attribution
Space, Cyber, and Telecommunications Law

2016 ACTIVE CONTRACTS, GRANTS AND TASK ORDERS

Screening for BoNT/A inhibitors using the BoTest A/E BoNT1 Detection Assay

Principal Investigator: Ken Bayles, Ph.D.
Sponsor: USAMRIID

Manufacture of Recombinant Ricin Vaccine

Principal Investigator: Wally Buchholz, Ph.D.
Sponsor: USAMRIID

Intelligence Support to Deterrence Operations

Principal Investigators: Gina Ligon, Ph.D.,
Mario Scalora, Ph.D.
Sponsor: USSTRATCOM

Risk Analysis for Extended Nuclear Deterrence

Principal Investigator: Rupal Mehta, Ph.D.
Sponsor: USSTRATCOM

Development and Assessment of Narrative and Counter-Narrative within a Deterrence Framework

Principal Investigators: Gina Ligon, Ph.D.,
Mario Scalora, Ph.D.
Sponsor: USSTRATCOM

Functionalized Metallic Surfaces for Enhanced Heat Transfer, Drag Reduction, and Novel Power Sources

Principal Investigator: Dennis Alexander, Ph.D.
Sponsor: ONR

Immunomics Unit Research Support of USAMRIID Center for Genome Sciences

Principal Investigator: Mariano Sanchez-Lockhart, Ph.D.
Sponsor: USAMRIID

Strategic Leadership Fellows Program

Principal Investigator: Gina Ligon, Ph.D.
Sponsor: USSTRATCOM

Next Generation Sequence Training Module

Principal Investigator: Michael Wiley, Ph.D.
Sponsor: JPEO-CBD

Exploration of Horizontal and Vertical Nuclear Proliferation

Principal Investigator: Rupal Mehta, Ph.D.
Sponsor: USSTRATCOM

Decision Support Capabilities for National Leadership – Phase II

Principal Investigator: Dr. Douglas Derrick, Ph.D.
Sponsor: USSTRATCOM

Traffic Calming Elements for Entry Control Facility Threat Delay and Containment – Phase 2

Principal Investigator: Lawrence Rilett, Ph.D.
Sponsor: USTRANSCOM

Critical Infrastructure Resilience and Supervisory Control and Data Acquisition (SCADA) Research on Vulnerability Discovery and Risk Mitigation

Principal Investigator: William Mahoney, Ph.D.
Sponsor: USSTRATCOM

Intelligence Support to Deterrence Operations - Phase 2

Principal Investigator: Gina Ligon, Ph.D.
Sponsor: USSTRATCOM

Pavement Friction and Vehicle Performance Limits Evaluation

Principal Investigator: Lawrence Rilett, Ph.D.
Sponsor: USACE

Traffic Calming Elements for Entry Control Facility Threat Delay and Containment – Phase 3

Principal Investigator: Lawrence Rilett, Ph.D.
Sponsor: SDDC

Advanced Collaboration Enterprise Services (ACES)

Principal Investigator: Douglas Derrick, Ph.D.
Sponsor: RTTO

Fundamental Studies on Functionalizing Metallic Surfaces with Applications to Enhanced Heat Transfer and Drag Reduction; Novel Power Sources

Principal Investigator: Dennis Alexander, Ph.D.
Sponsor: Office of Naval Research

Verification and Validation of a Dynamic Internal State Variable Constitutive and Failure Model for Glassy Polymers

Principal Investigator: Mehrdad Negahban, Ph.D.
Sponsor: ARL

Biological Field and Laboratory Support

Principal Investigator: Dillian Cunningham
Sponsor: DTRA

Strategic Leadership Fellows Program

Principal Investigator: Gina Ligon, Ph.D.
Sponsor: USSTRATCOM

Endovascular Skills for Trauma and Resuscitative Surgery (ESTARS) Curriculum Analysis and Development of Strategic Transition Plan

Principal Investigator: Jason MacTaggart, M.D.
Sponsor: USAMRMC

Traffic Calming Elements for Entry Control - Phase 4

Principal Investigator: Lawrence Rilett, Ph.D.
Sponsor: SDDC

Target Enrichment Studies

Principal Investigator: Ken Bayles, Ph.D.
Sponsor: USAMRIID

En Route Care Technology Development

Principal Investigators: Keely Buesing, M.D., Benjamin Terry, Ph.D., Mark Borden, Ph.D.
Sponsor: USAF Surgeon General Office

Cyberbiosecurity

Principal Investigators: Wally Buchholz, Ph.D., Randall Murch, Ph.D.,
Sponsor: DoD

Identification of Stability Indicating Assays to Support Formulation Development Work

Principal Investigator: James Talmadge, Ph.D.
Sponsor: Battelle

Assessing the Benefits and Burdens of Nuclear Latency

Principal Investigator: Rupal Mehta, Ph.D.
Sponsor: DTRA



<https://nsri.nebraska.edu/publicationsandreports>

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BOARD OF DIRECTORS:

The NSRI Board of Directors serve in an advisory role and have the authority and responsibility to commit personnel, facilities and other required resources to support the needs of NSRI in completing projects awarded by USSTRATCOM and other DoD and federal agencies. Board members are appointed with

proven leadership and expertise in government, military, industry and university sectors.

Three board positions are held by the University of Nebraska's chief research officers—Vice Chancellor of Research and Economic Development at the University of

Nebraska—Lincoln, Associate Vice Chancellor for Research and Creative Activity at the University of Nebraska at Omaha and Vice Chancellor for Research at the University of Nebraska Medical Center. This ensures the integration of NSRI and NU research strategies in support of the NSRI mission.

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U.S. Navy Vice Adm.
(Ret.)



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Vice-Chairman
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ABOUT

The National Strategic Research Institute (NSRI) at the University of Nebraska is one of 13 University Affiliated Research Centers (UARCs) in the nation. Established in 2012, NSRI is engaged in a long-term, strategic partnership with our Department of Defense (DoD) sponsor, United States Strategic Command (USSTRATCOM). The NSRI provides mission-essential research and development capabilities for combating weapons of mass destruction in five core competencies:



1 NUCLEAR DETECTION AND FORENSICS



2 DETECTION OF CHEMICAL AND BIOLOGICAL WEAPONS



3 MEDICAL PASSIVE DEFENSE AGAINST WEAPONS OF MASS DESTRUCTION



4 CONSEQUENCE MANAGEMENT



5 SPACE, CYBER AND TELECOMMUNICATIONS LAW

NSRI VISION:

To be the Lead Combating Weapons of Mass Destruction academic research institution, delivering relevant mission essential research and development solutions to the warfighter, Department of Defense and other national security agencies.

NSRI MISSION:

To provide innovative and customer-focused research and development solutions for complex national security requirements to combat weapons of mass destruction.

[NSRI.NEBRASKA.EDU](https://nsri.nebraska.edu)

SPONSORS:



UNITED STATES OF AMERICA DEPARTMENT OF DEFENSE (ODOD)

The mission of the Department of Defense is to provide the military forces needed to deter war and to protect the security of our country.

UNITED STATES STRATEGIC COMMAND (USSTRATCOM)

USSTRATCOM is one of nine DoD Combatant Commands. Its mission is to employ tailored nuclear, space, cyberspace, global strike, joint electronic warfare, missile defense, and intelligence capabilities that deter aggression, decisively responds if deterrence fails, assures allies, shapes adversary behavior, defeats terror, and defines the force of the future.





NATIONAL STRATEGIC RESEARCH INSTITUTE
at the University of Nebraska