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<b>14. ABSTRACT</b> The events of September 11, 2001 increased our Nation's awareness of the need for information and information systems security. It became quite clear after this event that the United States needed to develop research and educational infrastructures to address the threat. Thus, the focus of this Air Force Office of Scientific Research (AFOSR) funding helped develop relevant research and educational activities to address this threat. This report covers research, educational offerings, and outreach activities between April 2004 and June 2011 in the Center for Homeland Security. Highlights of each year are presented. Additionally, a discussion related to the sustainability of CHS is presented.					
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## **Final Performance Report**

**Center for Homeland Security in the  
National Institute of Science, Space, and Security Centers (NISSSC)**

**Formerly known as the Network Information and Space Security Center (NISSC)**

**Title:** (Congressional Interest) Network Information and Space Security Center

**Award No.:** FA9550-04-1-0239

**Performance Period:** April 1, 2004 - June 30, 2011

**Program Manager:** Dr. Robert Herklotz

Jenenne P. Nelson, Principal Investigator  
University of Colorado Colorado Springs

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### **Abstract**

The events of September 11, 2001 increased our Nation's awareness of the need for information and information systems security. It became quite clear after this event that the United States needed to develop research and educational infrastructures to address the threat. Thus, the focus of this Air Force Office of Scientific Research (AFOSR) funding helped develop relevant research and educational activities to address this threat. This report covers research, educational offerings, and outreach activities between 2004 and June 30, 2011 in the Center for Homeland Security. Highlights of each year are presented. Additionally, a discussion related to the sustainability of CHS is presented.

## **Introduction**

The events of September 11, 2001 clearly focused the United States need for information and information systems security. Part of this new awareness is the recognition that information and information systems are integral infrastructures for the security of our country. It became quite clear after this event that the United States needed to develop research and educational infrastructures to address the threat. Thus, the focus of this Air Force Office of Scientific Research (AFOSR) funding was to develop relevant research and educational activities, and support threat areas identified by USNORTHCOM and others.

In 2002, the Network Information Space Security Center (NISSC), now known as the Center of Homeland Security (CHS), was established at the University of Colorado Colorado Springs (UCCS) to satisfy critical US Space Command needs in technical, management, and policy areas related to information assurance, and future network and space system architectures. With the focus still on these needs, the mission of NISSC/CHS was to expand homeland defense and homeland security knowledge and knowledge transmission.

In April 2003, a Memorandum of Understanding (MOU) between US NORTHCOM and UCCS was signed. The MOU established collaborative partnerships between industry, military, government, and other academic institutions and it helped the NISSC focus its role in conducting theoretical and applied research; manage projects that provided focused study and technical assessments for complex systems issues, and facilitate the development and delivery of seminars, and certificate and academic programs that directly support homeland defense efforts.

In 2004, the University of Colorado Colorado Springs was awarded an Air Force Office of Scientific Research (AFOSR) funds to support the development of the Center for Homeland Security (CHS), formerly referred to as the NISSC. The following were the broad AFOSR grant objectives:

- Conduct research in areas directly related to the mission needs.
- Perform projects related to ongoing research efforts, and address identified issues/problems, both technical and non-technical, identified by USNORTHCOM and relates organizations.
- Transition research results into the academic curricula and training modules for military, government, and industry personnel in the area of homeland security and homeland defense.

Specifically, the major elements in the grant included:

- a) Conduct research in the following areas
  - Information sharing
  - Detecting and defending against threats
  - Civil and military coordination
  - National command and control, and international policy implications for homeland security and homeland defense
  - Health threats and responses to bio-terrorism events
- b) Expand research capacity
- c) Develop curricula and training modules
- d) Continue establishment of the organization NISSC

Over the grant years, NISSC/CHS has worked to address the aforementioned grant objectives. Specifically, educational programs were developed and seed research was funded to help expand infrastructure in the area of homeland defense and security. Additionally, the NISSC/CHS has worked to develop focused infrastructure (i.e., blade server) to assist with conducting research.

Several changes occurred over the award period in the principal investigators (PIs) (Drs. Rogers Redding, Jeremy Haefner, and Jenenne Nelson – current PI). In addition, the name of the Network Information Space Security Center (NISSC) was changed to the Center for Homeland Security, now part of a larger umbrella National Institute of Science, Space and Security Centers (NISSSC) on the campus of the University of Colorado Colorado Springs.

Today, the Center for Homeland Security is a Center within the National Institute of Science, Space, and Security Centers (NISSSC) at the University of Colorado Colorado Springs and is referred to as the CHS in the remainder of this report. The CHS has an international reputation for homeland security and homeland defense. Also, the CHS has been the driving force for the creation of the Masters of Public Affairs in Homeland Defense degree at the UCCS and other certificate programs. The CHS continues to advance its reputation nationally and internationally as a recognized leader in homeland security (HS) and homeland defense (HD) educational programs.

Unlike most funding, the CHS grant objectives were broad and the funds supported a large number of educational programs, research, and outreach activities; therefore, this report highlights its most significant activities. Additionally, publications supported during the grant period are presented. Below are selected highlights and successes by year.

### **Selected Highlights Before and in 2006**

Highlights and success accomplished during the start-up of CHS through 2006 with this award include the development and delivery of homeland security education to USNORTHCOM personnel and initial planning and development of the Masters of Arts in Public Administration on Homeland Security/Defense, initiated by a USNORTHCOM request. Additionally, during this time period seed research funds supported the following: (1) secure information sharing and collaborative work, (2) improved measurable performance under cyber threats by information fusion, (3) improved NASA Engineering processes involving vehicle management systems; (4) dynamic data fusion network and tiered video streaming for video surveillance, (5) improved fuel cell membrane to support US energy security, (6) a trauma intervention for first responders; (7) a clinical psychological evaluations of dangerous world leaders, (8) a multi-agency model for Bi-national cooperation along US/Mexico border, (9) an exploration of the roots of support for Islamic terrorism: A terror management theory approach, and (10) focused energy security and alternate sources of energy.

The CHS expanded its mission in 2006 when the NISSSC (National Institute for Science, Space and Security Centers) was awarded follow-on funding (FA9550-06-1-0477) to continue the efforts and objectives started by CHS to continue to meet the needs in research, education, and training in the areas of HS and HD.

### **Selected Highlight in 2007**

As the CHS engaged in outreach to many military and civilian organizations, it continued to funded seed research, and the CHS began new educational endeavors, and a number of initiatives were actualized in 2007. Below are highlights during this year.

- Delivered a graduate-level homeland security certificate program to USNORTHCOM personnel.
- Developed and launched an undergraduate certificate in homeland security/defense.
- In conjunction with the Graduate School of Public Affairs at the University of Colorado at Denver, developed a business model and curriculum for a Master of Arts in Public Administration with a concentration in Homeland Security/Defense as initiated by USNORTHCOM request.

- Developed a new graduate certificate program in Disaster Medicine (HLD/HLS case specific) in conjunction with US Northern Command Surgeon General's office and UCCS Beth-El College of Nursing and Health Sciences.
- Completing MOU with National Defense University (NDU) to offer degree programs for NDU certificate students (principally in Engineering and Applied Sciences, Graduate School of Public Administration, and the College of Business).
- Funded research on Terror Management Theory and Human Factors research to support HLS psychology of terrorism studies.
- Began collaborations with the Economic Development Corporation and Biological Targets to develop a funded Bio-Defense Research area (in collaboration with US Northern Command).
- Completed MOU with Pacific Disaster Center (PDC), in partnership with the Trauma Health & Hazards Center, for all-hazards research collaboration with PDC in regional disaster management research projects.
- Started collaborations with Colorado College and private sector on security impact of pandemic influenza (headed by Dr. Andrew Price-Smith).
- Developed partnership with Harvard Law School's homeland security project to share curricula and research.
- Began developing a partnership with Texas A&M, San Diego State University, Eastern Kentucky University, and private sector in emergency management (state/local) program collaboration and in a cooperative intelligence program.

### **Selected Highlight in 2008**

As the CHS continued to develop, additional personnel were added to the staff to meet the grant objectives. Below are highlights of the grant activity that extended the CHS reputation internationally.

- Completed the full sequence of three courses, and started a second cycle in the new CHS Undergraduate Certificate Program in Homeland Defense and Security.
- Developed first Transatlantic Civil Security Executive course, in conjunction with the George C. Marshall Center.
- Partnered with Business Executives for National Security and Infra-Guard to provide HS training and education assistance to federal and regional agencies supporting the Democratic National Convention (Denver, CO).
- Partnered with Business Executives for National Security to provide education/training and USNORTHCOM-based research perspective on Public-Private Sector "Public Benefit Corporation".

- Continued collaborations with Colorado College and the private sector on security impact of pandemic influenza (a partnership with Dr. Andrew Price-Smith).
- Facilitated international conference on transatlantic civil security for the George C. Marshall School of European Security Studies; developed 4-week Seminars in Trans-Atlantic Civil Security (STACS) for the Marshall Center.
- Established working relationship with Colorado South Central All Hazards Region to support State and regional emergency management training, education and research. Hosted delegation from Singapore Defense Forces to discuss defense support to civil authorities and critical infrastructure protection. On their request, working with USNORTHCOM to develop and deliver an international HS training program.
- Significant new Center staff added included: Associate Directors for Curriculum Development and Government/Private Sector Programs and Faculty Directors of Information Sciences Research, and Human Factors Research.
- Provided planning and logistics support to multi-agency and jurisdiction emergency management Exercise Entry Point.
- Supported Homeland Security Exercise Evaluation (HSEEP) - compliant weapons of mass destruction (WMD) full-scale exercise for 300+ on the University of Colorado Colorado Springs (UCCS) Campus, city of Colorado Springs, and El Paso County emergency responders; hosted HSEEP-compliant WMD tabletop exercise for 100+ on the UCCS Campus, City of Colorado Springs, and El Paso County emergency responders
- Developed and refined the concept of operations for the city of Colorado Springs (CS) Emergency Operations Plan. CHS continues to work closely with the Colorado Springs City Director of Emergency Management for regular plan updates and community-based (EM) strategy sessions.
- Working as USNORTHCOM educational lead to expand the Command presence in International Civil Security. Continued collaboration with Carleton University (Ottawa) to establish a joint effort in North American civil security. Developed linkage with Cranfield University (UK). Both Cranfield and Carleton have Defense Ministry sponsorship and have mature HS and civil security programs.
- Developed Geographic Information Systems (Geo-engineering) track within the Engineering Management Master's Degree program at UCCS. The program designed to include four courses and a two semester project. This program is directed toward Department of Defense (DoD) personnel seeking to learn more about IGIS (the successor to GeoBase – the United States Air Force (USAF) installation management/GIS program).
- Authored Memorandum of Understanding (MOU) for Air Force Space Command (AFSPC) dealing with Geographic Information Systems, Emergency Management and related areas.

- Outreach to United States (US) National Association of Cost Estimators for development of DoD oriented certificate course in project management and cost estimation.
- Initiated course development “Psychology and Terrorism”, (a special topics course) to be developed as a Senior Seminar in the Department of Psychology.
- Continued preparations for delivery of the new graduate certificate program in Disaster Medicine (DM) (homeland defense/security case specific) in conjunction with USNORTHCOM Surgeon General Office and UCCS, Beth-El College of Nursing and Health Sciences.
- Consulted with United States Air Force Academy (USAFA) in the development and execution of first active shooter scenario; coordinated with Arapahoe County (Aurora, CO) Sheriff’s SWAT team in conjunction with mass exercise – building stronger relations with local universities, military community, and law enforcement agencies.
- Pre-proposal submitted to START (University of Maryland Study of Terrorism and Responses to Terrorism): Mitigating the Impact of Fear on Support for Terrorism and Harsh Terrorist Countermeasures in collaboration with Jessica Stern (Kennedy School of Government) and Dalia Mogahed (Gallup Center for Islamic Studies).
- CHS continued to fund Human Factors research (Department of Homeland Security Directorate of Science and Technology priority area) in Terror Management Theory. The research is directed by Dr. T. Pyszczynski (CHS Director of Human Factors Research), who is lead an international field study team.
- Submitted National Science Foundation (NSF) Proposal for Geographic Information Systems Education collaboration with local industry and Pikes Peak Community College.
- Collaborations with Dr. Elena Mastors, Mr. Jeff Norwitz and Mr. Robert Perry at the Naval War College on Psychology and Terrorism research.
- Attended *NATO Conference on Indigenous Terrorism*, Budapest, Hungary. Ongoing research collaboration established with Anne Speckhard (US Department of State) to do experiments on root causes of terrorism in Muslim group in Morocco, Europe, and Iraq.
- Conducted an United States Air Force wide analysis on Emergency Management Information Systems needs. Survey approximately 1000 USAF personnel. Data were analyzed to identify key USAF information system requirements for Incident Management. Analysis sent to USAF GeoIntegration Office. This is the first study of its type within the DoD, and it has an unprecedented sample from the Incident Management community/population.

- Grant Submitted: Political Will Expert Reasoning (POWER) project in collaboration with 21CSI Inc., under STTR OSD07-T002 (Measuring and Mapping Political Will). This is a proposed phase 2 STTR project under the Office of the Secretary of Defense. POWER is an experimental, practical Political Will decision support tool for strategic planning in unstable world regions (not funded).
- Ongoing research efforts by the Director of Human Factors Research, which included meeting with United States Army Psychological Services staff to arrange collaboration on studies on PTSD in returning soldiers initiating data collection on PTSD in soldiers returning from Afghanistan and Iraq, and meeting with British, Dutch, Polish, and German colleagues to set up collaboration on terrorism research.

### **Selected Highlight in 2009**

The CHS continued to work with partners internationally. Many international partners expressed interest in the mission of CHS. Highlights in 2009 demonstrate the need for the Center focusing on homeland defense/homeland security research, and education.

- Met with British and Dutch colleagues to plan a new international study on the effect of thoughts related to 9/11, Iraq war, 7/7 UK attacks, and one's own death on support for terrorism and military interventions in the Middle East, among American, British, Dutch, Turkish, and Iranian people.
- Continued progress toward an USAF-wide Incident Command/Emergency Operations Management project. White paper submitted and well-received by Pentagon-level (Air Staff). [The Air Staff agreed to the study. The study was conducted in 2008: An emergency management computer system requirements questionnaire was distributed to almost one thousand emergency response representatives from all MAJCOMS. This is the largest emergency management user requirements study in this field that I am aware of.] The requirements study preliminary white paper was published on our website.
- Developed and delivered 1<sup>st</sup> and 2<sup>nd</sup> iterations of Seminar in Transatlantic Civil Security to the George C. Marshall Center for European Security Studies in Garmisch-Partenkirchen, Germany. The 17-day course included approximately 43 participants from over 20 nations. The course content provided "best practice" information in the areas of Homeland Defense and Defense Support of Civil Authorities. This course is now the most popular and successful academic offering at the Marshall Center.

- Working with NORAD-USNORTHCOM and the Beth-El College of Nursing and Health Sciences, as well as the School of Public Affairs at UCCS, the two new homeland security-related certification programs in Intelligence and Disaster Public Health were launched and delivered.
- Supported development of \$150K grant proposal to National Science Foundation to conduct workshops on Systems Approach to Security[NOT AWARDED]
- Submitted Grant to the National Science Foundation MINERVA Program: Development, Globalization and Environment: A Systems Approach to Security, Conflict and Cooperation. \$148,722. [NOT AWARDED]
- Contract developed with Air Force Space Command via Booz-Allen-Hamilton: Incident Management Evaluation Program. Funding secured (\$30,000); however, the legal agreement between UCCS and the program partners could not be approved. [NOT AWARDED].
- In September, 2009, delivered presentation for NORAD-USNORTHCOM Joint Professional Military Education, “Homeland Security: Building Community Resilience.”
- Research presentation delivered at the 7<sup>th</sup> Biennial Society for the Psychological Study of Social Issues conference discussing the findings/research on the relationship between psychology, socio-economic development, and terrorism.
- Initiated study on effects of thoughts of different aspects of US foreign policy on attitudes toward US and support for our policies in the Middle East among French citizens [PENDING].
- Contract negotiations conducted to facilitate UCCS ability to engage in directly funded research for AFSPC GeoIntegration Office.
- Emergency Response Systems needs analysis for the Air National Guard. Meetings between Dr. Sambrook, Mr. Robillard and Mark Barner at USAFA to create partnered research effort (UCCS – US Air Force Academy).
- Conducted a “Capabilities-Based Planning Process Study State of Colorado Key Stakeholder Survey”, on behalf of the Colorado Office of Homeland Security.
- Internal White Paper developed and submitted on research in Homeland Defense & Incident Management. Resulted in \$70k AFOSR sub-award out of the Center for Space Studies) to support Dr. Roger Sambrook’s research. Project funding was to continue pilot study in Emergency Response Operations Systems Integration (EROSI) for Air Force Space Command.
- Conducted/completed Senior Seminar: *Psychology of Terrorism*. Seminar drew on published research, ongoing book research and work for Department of Homeland Security (terrorist profiling) in examining areas such as domestic and international terrorism, terrorist profiling, and red-teaming.

- Completed “Perceptions of Workforce Requirements in Homeland Security and Homeland Defense,” National Homeland Defense Foundation/Career Summit participation survey. Poster presented at UCCS Mountain Lion Research Day.
- Conducted study and analysis “Colleges & Universities Offering Graduate and Undergraduate Homeland Security Programs; A Comparison with UCCS CHS Programs: Graduate Certificate in Homeland Defense; Undergraduate Certificate in Homeland Security.”
- Developed certificate program review using a modified retrospective pre-test/posttest methodology on 423 students having taken homeland security/defense courses since the inception of the certificate program in 2002. Initial data will support the next proposal to continue the program with NORAD/NORTHCOM.
- Co-hosted first award ceremony to present Graduate Certificates in Homeland Defense to NORAD/NORTHCOM, 21 January 2009.
- Promoted PILLAR Lecture Series, “Yugoslavia, A Case Study on Why and How America Goes to War”.
- Participated in Ft. Carson Town Hall Meeting, *Preparing our Community for 40,000+ New Soldiers & Family Members*.
- Co-hosted US-Korean Relations Panel, March 13, 2009 with UCCS College of Education, Daegu English Village.
- Engaged as a founding partner with the Homeland Security and Defense Education Consortium Association to develop national academic standards for homeland security education.
- Engaged with South Central All-Hazards Region, El Paso County Sheriff’s Office, and Pikes Peak Community College to co-facilitate a HSEEP compliant table-top exercise, *Alpha Point*.
- Completed a short article entitled: *State of Colorado Governor’s Office of Homeland Security: “Freshman Year” in Perspective*.
- Completed a journal article entitled: *“Adaptation and Application of Federal Capabilities-Based Planning Models to Individual States: State of Colorado Case Study.”* Submitted for publication to *Journal for Homeland Security and Emergency Management*.
- Conducted new collaborative research with Gilad Hirschberger, University of Ba-Ilan, Israel, on effects of thoughts of the Holocaust on attitudes to Palestinian-Israeli Conflict among Israelis.
- Initiated Joint Homeland Security Studies program between UCCS and University of Zagreb, Croatia (City of Zagreb funding). Conducted three days of meetings with City/University of Zagreb, Croatia officials to structure terms for a partnership with UCCS. In the short-term, UCCS will develop and deliver several courses in homeland security and assist the University of Zagreb in establishing a

regional (Eastern Europe) Center of Excellence in Homeland Security. In the long-term, UCCS will assist the University of Zagreb in maturing the Center of Excellence and designing, developing and delivering masters and doctoral degrees in homeland security. Hosted a group of six officials from the City and University of Zagreb, Croatia from August 10 to 15, 2009, as guests of UCCS/NISSSC/CHS. The purpose of the visit was to gain a better understanding of US federal, state and local emergency management processes and procedures, and to finalize plans for partnering with UCCS to provide civil security education in Zagreb, greater Croatia and, eventually, eastern Europe. Short term goal is to develop a 2-year Master's Degree in Civil Security, initially accredited by UZ. The program will consist of 14 courses (6 core courses, 7 electives and 1 thesis). Courses will be delivered by NISSSC/CHS and UZ instructors. Using blended teaching techniques including 3-week compressed onsite instruction and distance learning methods. This project is on hold waiting funding from the University of Zagreb, Croatia.

- Delivered lesson plans for 4-course cyber security program to National Space Security Institute.
- Contracted with Homeland Security Careers to provide a service to enrolled students for career development, networking, and mentorship with homeland security professionals across the United States.
- Submitted \$328K Letter of Intent to The Robert Wood Johnson Foundation to develop a definition of "special needs" populations and propose model legislation for nationwide disaster planning. May 2009. There were 235 letters of intent submitted. Unfortunately, our proposal was not selected to submit a full proposal.
- Conducted new research with Matt Motyl to assess impact of support for war on compensatory commitment to unrelated moral values.
- Hired Dr. Pelin Kesebir, post-doctoral research associate, to assist Dr. Tom Pyszczynski in building on the Center's research on terrorism.
- Initiated development of new graduate level certificate course with the School of Public Affairs on "Homeland Security and Homeland Defense under the U.S. Constitution."
- Developed MOU between AFSPC and UCCS for Incident Management & Emergency Response.

### **Selected Highlight in 2010 and 2011**

Outreach, research and education activities continued; however, a greater focus had been placed on sustainability of the CHS and NISSSC when grant funding ends.

Many activities during this year focus on maintaining funding streams for the CHS and the NISSSC.

- Conducted initial meeting on development of Homeland Defense/Security degree with UCCS School of Public Affairs (SPA). The SPA is developing an undergraduate degree offering in Homeland Defense/Security.
- Co-hosted CHS graduate certificate completion ceremony with USNORTHCOM; over 40 students received CHS certificates.
- Met with Colorado Director, Homeland Security, Mason Whitney (MG – ret) and department officials to discuss potential research, educational services, and intern program. Discussions resulted in collaboration with CHS.
- Multiple meetings with USNORTHCOM and community partners to discuss an International Center of Excellence for Homeland Defense and Defense Support of Civil Authorities (ICOE). A Hawaii-based organization has been hired to build the ICOE. NISSSC will have an opportunity to develop educational services for the ICOE.
- Presentation on value of higher education to professional development at the Homeland Security Career Summit in Colorado Springs, CO with over 200 people in attendance.
- Participant in the National Homeland Defense Symposium.
- Met with National Homeland Defense Foundation CEO to discuss 2010 symposium and potential partnering.
- Began discussion with Challenger Learning Center in Colorado Springs to discuss future collaboration with Center for STEM Education (CSTEME), Center for Space Studies (CSS) and Center for Homeland Security (CHS) to develop K-12 STEM programs related to HS/HD areas.
- Participated in community meeting on “Space Journey” at United States Air Force Academy (USAFA). This initiative is a new interactive museum to showcase military space history, products and generate public awareness.
- Keynote speaker at Marshall Center, Garmish, Germany. Comments focused on trends in homeland security education. Also, participated in STACS (Seminar on Trans-Atlantic Civil Security) discussion with students.
- Keynote speaker at the “50 for Colorado” conference. 50 for Colorado is a group of representatives from throughout Colorado taking leadership training sponsored by University of Colorado at Boulder.
- Guest speaker for the Marine War College visit to USNORTHCOM.
- Blade server and lab equipment procured and installed under AFOSR grants FA9550-04-1-0239 and FA9550-06-1-0477 in the new Science and Engineering Building (SENG) to directly support both grants’ objectives to increase UCCS’ research capacity in cyber security, physical security, homeland security, and

- other areas. Updated and upgraded capabilities and software to enable a path for large public and private cloud (virtualization) infrastructure and increased performance and storage capabilities. The System is used to conduct research in disaster recovery and system restoration which is critical to homeland and cyber security research. Virtualization has allowed us to build a new, multi-purpose datacenter housing multiple environments to attract more research funding, expand classroom services and improve operational capabilities.
- Funded heat exchange system expenditure for SENG physics lab in further support of grant objective to increase research capacity and specifically the work of Drs. Celinski and Camley in the area of physics of high frequency signal processing of electromagnetic waves at specific frequency ranges that are particularly interesting and important as there are a number of possible military and civilian applications to be explored.
  - Continued outreach to the Colorado Springs community emergency management agencies to assess research and educational needs.
  - Developed and delivered the Near Earth Object (NEO) educational workshop for K-12 students. Workshop focuses on Space, Emergency Management, and Trauma fields applied to STEM areas.
  - Started an online undergraduate and graduate Certificate in Disaster Public Health with the first class enrolling 15 students.
  - Dr. Roger Sambrook, CHS' Faculty Director of Information Sciences Research received a \$40,000 Grant through USAFA BAA entitled: "An Ontology for USAF Emergency Management", which focuses on building software for command and control of emergency management response. The original Emergency Response Operations Systems Integration (EROSI) (funded within NISSC/Center for Space Studies) project began conducting research on Air National Guard Emergency Management Software development. The follow on funding from the USAFA is a collaborative effort with USAFA Institute for Information Technology Applications (IITA). This research expands existing collaborations with AFSPC on Emergency Management systems. If this collaboration continues with AFSPC investigating the challenges facing AF wide standardization of emergency management technologies.
  - Received a \$67,400 contract from Defense Threat Reduction Agency (DTRA) to host a Disaster Public Health Colloquium in March 2010 held at UCCS.
  - Ongoing CHS funded research on individual state and large urban areas targets defining "special needs" populations in their mass evacuation plans. IRB-approved survey completed by 94 senior emergency management personnel from 43 states. Findings from this research will help to develop an unambiguous definition of "special needs" and propose model legislation that will facilitate

- improvement of intrastate and interstate mass evacuation plans for special needs populations.
- Participated in El Paso County full-scale emergency response exercise.
  - Collaborated with UCCS Department of Public Safety to submit a proposal for Emergency Management in Higher Education (EMHE) to the Department of Homeland Security and the Department of Education.
  - Met with the President of Croatia at his office in Zagreb, Croatia to discuss Joint Homeland Security Studies program between UCCS and Croatia. President Josipović is interested, in the short-term, in funding UCCS to develop a defense support of civil authorities' course for the Croatian Armed Forces. Initial proposal has been submitted.
  - Facilitated the 4<sup>th</sup> iteration of the Seminar on Trans-Atlantic Civil Security (STACS) at the George C. Marshall Center College of International and Security Studies, Garmisch, Germany. Forty-five students from thirty-three countries participated in STACS.
  - Began to develop a UCCS freshman level course comprised of a range of homeland security/defense topics. The goal of the course is to develop freshman college skills and encourage engagement in Homeland Security (HS) and Homeland Defense (HD).
  - DTRA/Internet Reliability: Revised and submitted \$250K study proposal to examine how the US relies on the "loading of the Internet" during emergencies (pending). (PIs: Drs. Chow, Zhou, and NISSSC).
  - Conducted an academic program review of the UCCS homeland security and homeland defense certificate programs and students' perception of its growth as a whole over the course of their study through an evaluation of objectives and outcomes from specific course content; learning outcomes based on the Department of Homeland Security's academic standards list; and self-evaluation of personal skill enhancement, job performance, workforce marketability, and overall educational experience were examined.
  - Dr. Pyszczynski and his research associates initiated new research on the impact of the Iranian government's repression of election protestors on support for Political and Militant Islam in various Muslim countries.
  - Met with Director of Intelligence for NORAD and USNORTHCOM (N-NC/J2) to build partnership with CHS. CHS will act as N-NC/J2's "one-stop-shop" in academic support for its mission.
  - Met with leadership of Homeland Security Defense Education Consortium Alliance (HSDECA) to clarify roles and improve cooperation between UCCS and other universities nationwide in homeland security/homeland defense research, education and outreach.

- Collaborated with EROSI research project team and CSTEME to develop the “Toxic Plume” workshop illustrating the fields of forensics, emergency management, geographic information systems and robotics. One hundred-three students participated in these interactive half-day workshops, which were held at the 2009 National Homeland Defense Foundation Symposium in Colorado Springs, CO.
- NORTHCOM International Center of Excellence (ICOE) – Presented concept brief to NORTHCOM.
- Participated in NORTHCOM International Homeland Defense and Civil Support Perspectives Forum, which included discussion of UCCS role in education pillar of ICOE.
- Developed and delivered 4-course Graduate Certificate in Security Intelligence.
- DHS BAA – Partnering with National Defense University and Naval Postgraduate School, submitted \$2.5M Security Education Initiative to Department of Homeland Security (NOT FUNDED).
- Submitted 1-year contract proposal to USNORTHCOM to conduct ten 1-week training workshops in HLD/HLS topics for military and civilian personnel. The workshops are built around the NORAD-USNORTHCOM Commander’s “Focus Areas” and are designed not only to educate and train the USNORTHCOM workforce, but also offer solutions to greatest challenges. [Contract Awarded]
- Teamed with the city of Colorado Springs to conduct survey of its residence measuring disaster preparedness.
- Short courses being developed in areas of Cyber Security and Mexico & Border Security. Audience would be students, military, and industry personnel (broad interest).
- Built a Video Conferencing (VTC) system to develop a robust communication capability and infrastructure to support an interconnected perimeter of networks to be used for cyber network security research, not only for Department of Defense projects but also for the Department of Homeland Security and local and state governments. This capability will be used to coordinate team exercises in terrorist attack response, disaster recovery, and cyber war scenarios for the cyber security and homeland security research and allows us to emulate activities and collect vital information on human system interaction and their responses to such stressful events.
- Funded the creation of a National Space Simulation Facility at the University of Colorado Colorado Springs. This facility will fulfill an important national need for a comprehensive space environment simulation capability and will further critical space engineering research in areas including rocket exhaust plume chemistry, which has several ballistic missile defense applications, and impact of

- the space environment on spacecraft materials and subsystems, all of which are relevant to Air Force and Missile Defense Agency interests.
- CHS has been part of the senior planning team for a community outreach effort called Up In Smoke – a series of exercises including basic drills and a table-top activity which will culminate into a Full-Scale Exercise to be held on Oct 1, 2011, providing participants with an opportunity to implement and evaluate current Emergency Operations Plans, Mass Care Shelters Plans, as well as other plans, policies, concepts, and capabilities for a response to a large wildfire event that results in mass evacuation requiring the implementation of county mass care and medical surge capabilities.

### **Looking Toward the Future**

The Center for Homeland Security (CHS) has developed detailed plans for sustainability in Fiscal Year 2012 and beyond. These plans include a diversified portfolio of federal contracts, research grants, expansion of traditional and non-traditional education programs, and philanthropic donations.

Currently, CHS has several non-AFOSR revenue-generating programs. First, CHS teaches a series of graduate and undergraduate certificate programs. The Center continues, in conjunction with the UCCS School of Public Affairs at UCCS, to teach the Graduate Certificate in Homeland Defense, originally developed under contract, for the North American Aerospace Defense Command (NORAD) and USNORTHCOM. Additionally, CHS currently teaches an Undergraduate Certificate in Homeland Security geared toward enlisted military personnel and emergency responders, and a Graduate Certificate in Security Intelligence conferred by the UCCS School of Public Affairs. Additionally, The CHS teaches the Undergraduate/Graduate Certificates in Disaster Public Health which is conferred by Beth-El College of Nursing and Health Sciences at UCCS. These courses net approximately \$90K per year for CHS.

Using the 4-course homeland defense program as the foundation, CHS designed and developed the Seminar in Transatlantic Civil Security (STACS). Since 2008, CHS has taught and facilitated five separate three and one-half week STACS programs at the George C. Marshall European Center for Security Studies in Garmisch-Partenkirchen, Germany. Approximately 45 mid- to senior-level military and civilian professionals from approximately 32 nations participate in each STACS program. Using lectures, seminars, workshops and exercises, STACS is designed to educate professionals from civil security agencies in Europe, Eurasia and around the world in best practices for ensuring civil security and preventing, preparing for and managing the consequences of domestic and regional crises and disasters. STACS nets approximately \$26K per year for CHS.

Engaging in national and international programs and homeland security exercises has increased the use of the VTC equipment significantly. CHS staff uses the VTC to coordinate team exercises with simulated terrorist attack response, engage in disaster recovery, and contribute to the realism of cyber security and homeland security research. In addition, the VTC equipment is used by CHS and UCCS staff and faculty for other meetings as needed.

Recently CHS, under contract, began developing and delivering a series of 4-day training workshops to NORAD-USNORTHCOM personnel. Training workshop topics include: (1) The Threat of Terrorism; (2) Interagency Relationships; (3) Mexico, Border Security and Transnational Criminal Organizations; (4) CBRNE Consequence Management; Cybersecurity; (6) Aerospace Warning and Control & Ballistic Missile Defense; and (7) Maritime Warning & the Arctic. The workshops are built around the NORAD-USNORTHCOM Commander's "Focus Areas" and are designed not only to educate and train the USNORTHCOM workforce, but also to offer solutions to greatest challenges. This program nets approximately \$18K per year for CHS.

In the out years, CHS plans to broaden and diversify its revenue-generating programs in order to achieve long-term sustainability. Efforts underway include marketing CHS education and training programs nationally, expanding international education and training programs, expanding non-credit short courses and executive seminars, and growing and maturing research and grant-writing capabilities. CHS' long-term strategy is to be recognized worldwide as a preeminent leader in homeland security education, research and innovation.

Further, expansion of online and onsite CHS graduate and undergraduate certificate programs will include not only increasing enrollment through wider and more effective marketing, but also creation of new certificates such as in the world of cyber security. CHS' goal is to drive to \$150K net per year within five years.

The STACS contract with the George C. Marshall European Center for Security Studies expires in 2012. We believe that the Marshall Center fully intends to continue the STACS program through a new multi-year contract, as it is the most successful and most popular of all of the Marshall Center programs. Due to its superb past performance, CHS is well-positioned to be awarded the new contract, which is predicted to be a \$100-300K per year multi-year contract. CHS would net approximately \$25K-75K per year.

Similarly, CHS' contract to provide a series of training workshops for NORAD and USNORTHCOM personnel expires in 2011. We understand that NORAD and

USNORTHCOM intend to continue the workshop series with a new multi-year contract. Again, due to its superb past performance, CHS is well-positioned to be awarded the new contract, which is predicted to be a \$200K per year multi-year contract. CHS would net approximately \$25K per year.

CHS is a potential subcontractor for the NORAD and USNORTHCOM Technical and Advisory Support Services (TA2S) contract, under which NORAD and USNORTHCOM receive a wide variety of services, including training and education programs. CHS would net \$50-200K under this contract.

Sensing a new trend in homeland security education, and a growing demand from working professionals, CHS plans to move heavily into the world of non-credit short courses and executive seminars. Under a recently conducted pilot project, CHS sponsored a two-day short course "Mexico, Border Security & Drug Cartels" which generated modest net revenue for CHS, but proved the value of such short courses. CHS projects gross revenue of approximately \$50-75K per year as this program builds.

To round out its portfolio, CHS is making significant strides to rebuild its research capabilities and associated grant-generating efforts. As part of this mission CHS is seeking to expand both its research capacity and its community outreach by establishing a National Preparedness Laboratory for Resilience. A resilient community is one that bounces back from a disaster--it bends, but doesn't break. Cultivating resilience is a function of economic development, social capacity, civic and political partnerships, and a strong communication network. CHS aspires to capitalize on the research and intellectual capacity within the NISSC's four centers (Center for Homeland Security, Center for Space Studies, Center for Science, Technology, Engineering and Mathematics Education, and the Trauma, Health & Hazards Center) as well as its relationships and experience within the emergency management and military communities. These resources ideally position CHS for cutting-edge local and national-level research on community resilience.

The first step in this process is to demonstrate the capability for applied research and the need at the local and national level for this research. This fall (2011), CHS will participate in a full scale wildfire response exercise in the Colorado Springs area. In partnership with the Office of Emergency Management for Colorado Springs and other area partners, CHS will lend its expertise to the exercise. Concurrent with the exercise, CHS will deploy a survey to area residents, volunteers, and local medical and Red Cross staff. This survey will investigate the respondents' preparedness and resiliency to a disaster or prolonged emergency in the area and it will complement other national, state and local surveys to maximize potential comparisons of the Colorado Springs

respondents with other communities. The results of the survey will indicate the respondents' knowledge, familiarity and compliance with FEMA guidance at [www.ready.gov](http://www.ready.gov). Similar surveys have indicated that less than 15% of the population is prepared for disasters or emergencies of a prolonged nature. Identifying the information, knowledge and training gaps in our community and first responders is a first step to improving civilian preparedness and resiliency in the wake of a natural or man-made disaster. The fall 2011 exercise and associated research is part of a larger effort to understand community preparedness across the spectrum from individual, to community, to national resiliency.

Recently, CHS added a PhD student to its research staff. The PhD student will lend expertise to the development and expansion of the National Preparedness Laboratory for Resilience. CHS anticipates significant grant funding to support this effort, coming predominantly from the Department of Homeland Security (DHS). Additionally, CHS intends to bring aboard at least two additional Associate Research Professors who will be dedicated to research and grant-writing as part of the larger National Preparedness Laboratory for Resilience effort. Finally, CHS has a four-year \$400K proposal pending with DHS to conduct research as a Center for the Study of Terrorism and Behavior (CSTAB) partner.

The recent addition of the National Space Simulation Facility has significantly increased the University research capacity. This facility is “one of a kind” and it fills an important national need for a comprehensive space environment simulation capability. Additionally, it will further critical space engineering research in areas including rocket exhaust plume chemistry and impact of the space environment on spacecraft materials and subsystems. Current research at UCCS involves the interactions of the space environment with engineering materials and systems. Numerical codes are currently used to predict the performance of materials in the near-Earth space environment. Because of the complexity of providing a facility that can provide simultaneous environments, experimental data in this area is non-existent. Experimental validation of numerical methods is required to assess the accuracy of the physical models incorporated in the numerical codes.

The addition and recent upgrade of the Blade server has significantly increased the research and teaching capabilities for the Engineering and Applied Science faculty and students on the UCCS campus. The Blade server includes a VMware vSphere platform with a 401W n+1 UPS, 24X7 datacenter in six dense rack environments. This equipment not only has expanded research capabilities but it has increased CHS's ability to enhance research collaborations with military and government agencies. The Blade

server resides in the newly constructed LEED gold certified Osborne Center on the UCCS campus.

In summary, CHS has a bright future with many opportunities for sustainability. Many of the components for a successful future are in place as a foundation. We plan to build on the CHS foundation and continue to move forward with many of the aforementioned initiatives.

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### **White Papers**

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White Paper to USAF (2009). Regional Training Facility. Currently being circulated within USAF

White Paper for AFOSR Faculty Research Fellowship program (1st step of application process).

White Paper (2009): \$3.3 million Academic Dimension to National Guard State Partnership Program. Interest expressed, but not ready at this time.

White Paper (2009): \$1.3 million NORAD-USNORTCOM International Center of Excellence (ICOE). In progress.

White Paper (2009): NORAD-USNORTHCOM Academic Colloquium. Concept approved.

White Paper (2009). \$250 thousand. Internet Reliability Study. Concept approved.

Pierce, T. (2007). Disruptive Innovation and the Defense Industrial Base

Haefner, J. (2007, February). Innovation in Homeland Defense/Security Education” (HLS Education Summit, Feb 07)

White, R. (2007, February). Game-Informed Learning for Homeland Defense Curricula.

### Presentations

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- Johnson, K. (2009). *Homeland Security Law and Strategy*. Presentation to Seminar on Trans-Atlantic Civil Security (STACS) at the George C. Marshall Center College of International and Security Studies, Garmisch, Germany. Press Club, Washington, D.C., on a chapter he authored, *Legal Issues in the Struggle against Terror* in the edited book entitled: *The Relations between Military and Civilian Authorities within the United States*. Presented at the National Press Club, Washington, D.C.
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- Kuehler, C., Cryer, L., & Sambrook, R. (2010, April). Poster presentation: *Using an emergency management scenario for fostering resilience and encouraging students' interest in STEM fields*. Mountain Lion Research Day, University of Colorado Colorado Springs, Colorado Springs, CO.
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