



# **FOURTH ANNUAL REPORT OF THE SAM NUNN SECURITY PROGRAM**

Center for International Strategy, Technology, and Policy  
Sam Nunn School of International Affairs  
The Ivan Allen College of Liberal Arts

May 31, 2007



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Explanatory Note: This report will cover the activities of the Sam Nunn Security Program during the period from January 1, 2006 to March 31, 2007. The John D. and Catherine T. MacArthur Foundation generously granted an extension through the end of March 2007 allowing us to continue to utilize funds from Grant# 02-73321-000-GSS, which was originally scheduled to run from January 1, 2003 to December 31, 2005. This report constitutes the final report of Grant# 02-73321-000-GSS. The extension allowed us to complete our third academic year of the Seminar on Science, Technology, and International Security, and to continue work begun before the receipt of our second grant period funding. During this period the Sam Nunn Security Program transitioned between grant number 02-73321-000-GSS (January 1, 2003 to March 31, 2007) and grant number 05-85838-000-GSS (July 1, 2006 to June 30, 2011)



## Fourth Year Overview

The activities of the Sam Nunn Security Program have been categorized for the purpose of this report into four groups: educational, research, policy interactions, and outreach. With respect to educational activities, 23 scientists and engineers participated in the Seminar on Science, Technology, and International Security during this reporting period, which overlapped two academic years. Furthermore, six Master of International Affairs students - almost all of whom had backgrounds in engineering or computer science - completed the seminar as well. This seminar is designed to give these individuals the tools necessary to evaluate policy options, and, bringing their subject matter expertise to bear, to produce politically, economically, and strategically feasible policy recommendations.

In the area of research, many fellows and faculty affiliated with the program produced contributions to the literature on topics in international security policy. The four research projects funded under the new grant (i.e. 05-85838-000-GSS) that deal with cyber security, information and communication technologies (ICTs) in post-conflict societies, nuclear nonproliferation, and building public-private partnerships for homeland security all got off to productive starts during this reporting period. Accounts of the activities of these projects can be found in the research section that begins on page five. Information on other research activities as well as published books, chapters, articles, and conference papers can be found both in that section as well as in the appendices. These research activities included work on the space-based economy, communications for disaster response, military hardware acquisition, the role of technology in economic development, the unmanned aerial vehicle revolution in military affairs, and much more.

Policy interaction conducted by members of the program included work with the US government, foreign governments, international organizations, and track II (unofficial / non-governmental) diplomatic efforts. Among the agencies of the US government that affiliated personnel advised or briefed were the Department of Defense (DoD), the Agency for International Development (US AID), the Department of Energy (DoE), the Central Intelligence Agency (CIA), the State Department, the Intelligence Science Board, and the Defense Science Board. Advisement and briefings to foreign governments included those of Liberia, Rwanda, Tunisia, China, Japan, South Korea, North Korea, Mongolia, and Uzbekistan. International organizations that Program personnel

worked with during this period include the International Telecommunication Union of the United Nations. The track II diplomatic efforts of Program personnel were primarily concerned with reducing the threat posed by nuclear arms in Northeast Asia. Details of these activities can be found in the section starting on page 9.

The Program's outreach activities include a lecture series that brought speakers such as Dr. Gary Samore of the Council on Foreign Relations, Ambassador John Kelly (former Ambassador to Lebanon), General Eugene Habiger (former Commander of Strategic Command), and Dr. Kennette Benedict (Executive Director of the *Bulletin of Atomic Scientists*) to Georgia Tech to speak on various subjects dealing with international security. We also hosted panel events on *Public Health Responses to Weapons of Mass Destruction* and *Challenges in Critical Infrastructure Protection* during this period. These and other activities are addressed on the section starting on page 21.

## **Education**

The Seminar on Science, Technology, and International Security is central to the activities of the program, and to its mission to facilitate bringing scientific and technological expertise to bear on international security policymaking. The 2006 calendar year covered two academic semesters of programmatic activities. In the Spring of 2006, the Program held its second semester of instruction for the 2005/2006 [henceforth referred to as the "third year"] fellows. The Spring 2006 semester was attended by ten pre-doctoral fellows and four International Affairs graduate students. The focus in this semester was on integrating knowledge gained during the previous semester's classes, as well as on the presentation of the results and conclusions of the fellows' individual research projects. Energy security, counterterrorism, critical infrastructure protection, war-gaming / simulation, and the ramifications of climate change were among the items addressed during this period. Each fellow gave periodic presentations on his or her research and received constructive faculty and peer review. All of the fellows' research topics are included in their brief biographies in Appendix B.

Fifteen fellows and students participated in the fall 2006 semester - ten pre-doctoral fellows, one post-doctoral fellow, two faculty fellows, and two International Affairs graduate students. The syllabus for this semester focused on introducing the fellows to national security policy formulation

and evaluation and to the role that science and technology plays in it, and case studies involving critical infrastructure protection and nuclear nonproliferation were used to apply this newfound understanding. A new pedagogical approach was employed this year that involved focusing on the topics examined in the decision exercises to a greater extent. These topics formed the basis of two modules that were used to give the fellows a greater depth of understanding of the analytical tools used in policy evaluation rather than giving a broad exposure to many different subject areas. All students participated in two policy decision exercises during the semester. The first of these exercises sought to expand the fellows' understanding of how policy decisions are made about what infrastructures to protect and how to protect them- given the limited resources available. The second exercise challenged the fellows to evaluate various approaches to nonproliferation or counterproliferation of nuclear weapons by way of the North Korean case. This second module required a thorough understanding of diplomatic principles because the "National Security Council" team had to brief their conclusions before Minister Kim Myong Gil of the DPRK.

In the first half of the second semester, the year four fellows were involved in a decision exercise module involving energy security. Fellows Santiago Balestrini, Jan Osburg, and Michael Shannon produced a poster based on their research into the number of nuclear reactors that would need to be constructed just to maintain nuclear energy's share of electric power generation into the future, and it won first prize among Ivan Allen College entrants at Georgia Tech's Graduate Research Symposium and third prize in the Institute for Sustainable Technology and Development Poster Session held at Georgia Tech in conjunction with a talk by former Vice President Al Gore. During the energy security module, a number of speakers were brought in to expand the fellows' understanding of the various challenges involved in ensuring the US has a secure and adequate supply of energy into the future. Professor Marilyn Brown, former Director of the Energy Efficiency and Renewable Energy Program at Oakridge National Laboratory, spoke to the fellows on US energy policy, Sam Nunn Faculty Fellow Nolan Hertel spoke about nuclear power, and Bill Bulpitt and Susan Stewart of the Strategy Energy Institute spoke on the topic of renewable energy developments.

On March 27, 2007, Greg Koch of the Coca-Cola Water Resources Team addressed the seminar to discuss the work that Coca-Cola is sponsoring to alleviate water scarcity worldwide. One of Coke's main philanthropic thrusts is in programs that seek to maintain sufficient supplies of clean water.



Because this is a problem that has ramifications for international security and that requires scientific and technological expertise to solve, Koch's presentation was beneficial for the fellows.

In addition to the seminar exercises, the research project, and exposure to speakers (see the Outreach section for additional discussion of speakers that addressed the Program), the fellows were taken on site visits to national security relevant facilities around the southeastern US and in Washington DC. During the Spring of 2006, the year three fellows took a trip to the Washington, DC area where they visited the Office of Senator Jeff Bingaman of New Mexico, the House Committee on Homeland Security Staff, the Department of Energy's National Nuclear Security Administration, the State Department, the Central Intelligence Agency, Aberdeen Proving Grounds, and Edgewood Chemical Biological Center. The week long trip to Washington is an integral part of teaching the fellows about the policymaking process through exposure to individuals involved in it on a daily basis. Individuals such as Jonathan Epstein of Senator Bingaman's office, Larry Gershwin – National Intelligence Officer for Science and Technology (S&T), and George Atkinson – S&T Advisor to the Secretary of State were able to give the fellows particularly valuable insights because they are all scientists in positions that influence national policymaking. Furthermore, the trip is an opportunity for the fellows to make connections with such people. In the fall, the year four fellows visited the Maritime Logistics Innovation Center, the Port of Savannah, and the Savannah River Site. The first two of these trips exposed the fellows to the cutting edge in technologies used to increase security of ports against terrorist attacks, as well as to the daunting task that remains ahead to further reduce such threats. At the Savannah River Site, fellows learned about the national security work being conducted at the Savannah River National Laboratory as well as the Cold War history of the facilities that were essential to the US nuclear weapons program. They also learned about the significant scientific and technical challenges posed by cleaning up the site and eliminating radioactive defense waste. In February, the fellows visited an electrical power plant owned by the Southern Company as part of the educational module on energy security. The trip was intended to increase the fellows' understanding of the nature of the security threats and the difficulties of keeping up with a growing demand for power.

The Program's Seminar on Science, Technology, and International Security was supplemented by other course offerings at the School of International Affairs as well as a class in the College of Computing that included substantial content addressing S&T and security. Such courses taught during the two 2006 semesters include those mentioned below:

<b>Related S&amp;T and Security Courses</b>	<b>Professor</b>
Challenge of Terrorism	Seymour Goodman
Computers, Communication, and International Development	Michael Best
Contemporary War Analysis	Michael Salomone
EU Energy Policy	Katja Weber
European Security Issues	Katja Weber
Global Governance and Nonproliferation	Brian Woodall
Globalization and the Politics of R&D Development	Dan Breznitz
Information Security Strategies and Policies (College of Computing)	Seymour Goodman
Innovation, the State, and Economic Development	Dan Breznitz
Intelligence Seminar	Richard Houska
International Security	Adam Stulberg
Introduction to US Intelligence	Richard Houska
Korea and Regional Security Issues	John Endicott
Modeling, Simulation, and Wargaming	Michael Salomone
National Security Law	Michael Williams
Pacific Security Issues	John Endicott
Path Gaming and Scenario Writing	Michael Salomone
Scientific Thought and International Relations	Edward Keene
Technology and Wargaming	Michael Salomone
Technology, Logistics, and War	Michael Salomone
Technology and Military Organization	Michael Salomone

## Research

This section will provide detail on some of the highlights of the years' research. An extensive list of publications from this period can be seen in Appendix B of this report.

At the heart of the research component of the program are the four research projects that were approved for the second grant period, but whose roots took hold during the first grant period. Additionally, many of the fellows and faculty pursued research related to science and international security as practitioners in their own fields. The first of the Program's core research projects is conducted jointly with Carnegie Mellon University's (CMU) Department of Engineering and Public Policy, and it examines how critical information infrastructures can be protected. A major thrust of this initiative is protection of these infrastructures in the developing world, because they cross-cut international boundaries and are in some ways only as strong as their weakest link. Co-PIs Professor Seymour Goodman and Professor Benoît Morel (of CMU) have directed the focus of this project toward two particularly illustrative cases: Rwanda and Tunisia. In May of 2006, Dr. Goodman made

an exploratory visit to Rwanda to build a foundation for prospective ICT related projects. There he met with members of the administration of the Kigali Institute of Science and Technology and the National University. During three weeks in the fall of 2006, this project hosted a small delegation of government employed African ICT experts in Pittsburgh, PA, Washington, DC, and Atlanta, GA with the intent of helping them to develop their national information security capabilities, to cultivate research partnerships, and to expand knowledge about the state of ICTs in their home nations while exposing them to new ideas from the US commercial, academic, and policymaking communities. Currently, planning is underway for a conference to be conducted in Tunisia in the fall of 2007 with sponsorship from the International Telecommunication Union.

The second research project addresses the role of ICTs in post-conflict Societies. This project combines the research expertise of faculty members with an understanding of ICTs including Professor Seymour Goodman and Assistant Professor Michael Best with those whose expertise is post-conflict reconciliation including Professor William Long, Associate Professor Peter Brecke, and Visiting Associate Professor Lyn Graybill. A workshop was conducted after the Sam Nunn Forum in March of 2006 to bring together relevant experts to engage in a discussion about the role that ICTs might play in post-conflict reconciliation. With respect to Liberia, this has resulted in a proposal to use ICTs and information and communication environments (ICEs) to aid in national restoration and reconciliation between survivors, victims, and perpetrators of violence. The proposal is entitled “TRC 2.0: Re-imagining Information and Communication Environments for Liberia’s Truth and Reconciliation Commission (TRC.)” This proposal discusses some of the ways that ICTs could aid in fulfilling the mission of the TRC, and acknowledges the need for user input during the design process to ensure that the resulting ICEs are locally relevant and useful.

The third project is an examination of how the NPT and broader international nuclear nonproliferation regime might be enhanced. The challenge being considered is how member buy-in can be maintained (or even expanded) while at the same time making the development of covert weapons programs more difficult. Professor John Endicott and Professor Nolan Hertel (Senior Research Fellow of the Program and faculty member of Georgia Tech’s Nuclear / Radiological Engineering Program) have teamed together to consider both the diplomatic and technical issues of this pressing problem. During the summer of 2006, papers on the perspectives of key nations, the IAEA, the export control organizations, and private nuclear energy concerns were solicited from a dozen experts for a workshop that was held on March 12-13, 2007. As of this writing, the twelve

papers are being revised in light of the feedback given by commentators and attendees of the workshop. These papers will form the chapters of a book that will be published with an intention of clarifying the debate and proposing the means to an alternative to the disastrous 2005 Review Conference in advance of the next conference in 2010. Presently planning is being conducted for a follow up event to be held in 2008.

The last of the four primary research initiatives was born out of the 2004 Sam Nunn Policy Forum. That event examined how public-private partnerships could be formed to facilitate more effective response in the face of a bioterrorism attack. This resulted in the formation of a roundtable of experts from academia, the business community, and the public health sector who meet regularly to address questions of how mass casualty events might best be handled by combining the resources and unique strengths of both the commercial and government sectors. It is well known that there is little surge capacity in the Emergency Medical System or in Public Health agencies to deal with a catastrophic event whether naturally-occurring or manmade. The roundtable has worked to investigate questions such as how a local sports facility could best be put to use as a field hospital or medicine distribution point in the case of a mass-casualty event.

In October of 2006, Professor Endicott presented a paper at the MEA-SIS Conference on Multilateralism, Disarmament, and Arms Control hosted by the Indian Institute for Defence Studies at Jawaharlal Nehru University. His presentation, entitled *Nuclear Free Zones: New Life – New Mission*, explored the possibilities for a nuclear weapon free zone regime for South Asia. This presentation built on the example posed by the September 9<sup>th</sup> creation of a Central Asian Nuclear Weapons Free Zone as well as his experience advocating for a Limited Nuclear Weapons Free Zone in Northeast Asia. Associate Professor Adam Stulberg also presented a paper at the MEA-SIS Conference. Dr. Stulberg's paper dealt with the prospects and challenges of applying the Cooperative Threat Reduction model to the case of India and Pakistan, and it drew heavily on the lessons learned from the implementation of threat reduction in Russia.

Dr. Stulberg also conducted research on the use of unmanned aerial vehicles (UAVs) by the US Air Force. This research focused on the effects of the changing nature of air operations on the organizational culture of the Air Force. Results from this study appeared in the spring 2007 issue of *Orbis* in an article entitled "Managing the Unmanned Revolution in the US Air Force." This research is part of a broader study conducted in partnership with Georgia Tech Professor Michael

Salomone about how revolutions in military affairs can best be managed. The book considers why some militaries are able to adapt to change smoothly while others get bogged down. The results of this study will be released in June of 2007 as a book entitled *Managing Defense Transformations: Agency, Culture, and Service Change*.

Assistant Professor Michael Best continued to conduct research on the subject of the role of ICTs in the developing world. *The Last Mile Initiative Innovations: Research Findings from the Georgia Institute of Technology* was published in 2006, which presented the results from field research conducted by Dr. Best and his graduate students in late 2005 and early 2006. Dr. Best also conducted extensive research in India on the telecommunications system of that country. Included among his published works of 2006 was “Impact and Sustainability of E-Government Services in Developing Countries: Lessons Learned from Tamil Nadu, India,” which was published in *The Information Society*. A more comprehensive list of the works presented during this timeframe can be seen in Appendix B.

Among those published in the Last Mile Initiative report, Lynn Hartley and Program Graduate Research Assistant Michael Murphree won first prize in the 2006 Telecommunications Policy Research Conference Student Paper Contest, and presented their paper entitled “Influences on the Partial Liberalization of Internet Service Provision in Ethiopia” at the conference held at George Mason University. The research for this paper was carried out in Addis Ababa, Ethiopia in December 2005 and January 2006. It should be noted that this pair of authors was but one of several sets of Dr. Best’s graduate students to conduct field research on the role of ICTs in the developing world. Other students conducted research in Peru, Macedonia, Rwanda, and Nigeria. [Note: Several of these students presented their research at the Sam Nunn Policy Forum Poster Session, and the titles of their papers can be seen in Appendix D of this report.]

Senior Research Fellow and Aerospace Engineering faculty member Professor Narayanan Komerath presented a paper entitled *Space-Based Economy Valuation, Analysis, and Refinement* at the Space 2006 Conference in San Jose, CA. This conference was hosted by the American Institute of Aeronautics and Astronautics. This paper continues work begun by Dr. Komerath in investigating the feasibility of commercial uses of outer space. Dr. Komerath’s technical work examines one of the most challenging barriers to commercial utilization of space – the constant risks presented by extremely fast moving debris. Should technical work such as that conducted by Dr. Komerath

determine a way to cope with these often tiny, but potentially devastating, missiles, then a host of political, diplomatic, and economic policy issues will need to be considered in detail. Dr. Komerath is a founding member of the 8<sup>th</sup> Continent Chamber of Commerce that considers how the resources of space can be exploited in a sound manner, and he participated in work for that organization as well during 2006. Dr. Komerath has also been conducting research related to energy systems in India, including a paper entitled *Are Distributed Energy Systems Optimal in India?* that was presented at the WAVES Conference and published in its proceedings.

Sam Nunn Fellow Santiago Balestrini and Faculty Fellow and director of the Aerospace Systems Design Laboratory [ASDL] Professor Dimitri Mavris have been conducting research for the Office of Naval Research that is intended to help them in the acquisitions decision-making process. Santiago presented papers at the 38<sup>th</sup> *IEEE Southeastern Symposium on System Theory* and the *American Society of Naval Engineer's Ships and Ship System Symposium* that described tools to help the Navy make optimal decisions about how to allocate their limited resources. The ASDL, headed by Dr. Mavris, has had a continuing relationship with the Sam Nunn Security Program from our inception. Each year one or more personnel from the ASDL have participated in our program. This center is among those seeing a need to expand the understanding of its personnel on issues of policymaking because of the relevance of this subject to the work in which they are engaged. Another ASDL employee, post-doctoral fellow Jan Osburg, conducted his research project for the seminar on the role that text messaging can play in post-disaster communications. In the wake of a major disaster, such as Katrina or 9-11, voice cellular telephony may be overwhelmed while text messaging is still operational. Dr. Osburg is currently conducting research on how this knowledge could be most effectively applied, and to what degree it would be affected by a nuclear event.

## **Policy Advisement**

Georgia Tech and the Sam Nunn Security Program work to bridge the gap between the scientific and policymaking communities through the actions of its faculty, fellows, and affiliated personnel. The leadership of two key supporters of the Sam Nunn Security Program, Georgia Tech President Wayne Clough and Senator Sam Nunn, has advanced the role of advisement on national and international science and technology policy issues. At the invitation of the White House, in July of 2006 President

Clough served as the senior US representative among G-8 participants at the Business and University Leaders Symposium on Innovation held in Moscow. The results of the conference concerning best policy practices for stimulating partnerships among business, government, and academic institutions were presented to the G-8 delegates at the St. Petersburg G-8 Summit. Dr. Clough's other policy interaction activities include his responsibilities as a member of the nanotechnology task force of the President's Council of Advisors on Science and Technology (PCAST), as the Vice Chair of the US Council on Competitiveness where he Co-Chairs the National Innovation Initiative, as Chairman of the Katrina disaster committee of the National Academies, and as Chair of *The Engineer of 2020 Project* of the National Academy of Engineering.

The program's namesake, former Georgia Senator Sam Nunn, continued in his work as the Co-Chairman and Chief Executive Officer of the Nuclear Threat Initiative (NTI) foundation, as a member of numerous corporate boards, and as a Distinguished Professor at Georgia Tech. Senator Nunn meets regularly with policymakers both in the United States and abroad. In September of 2006, Senator Nunn delivered a speech to the International Atomic Energy Agency (IAEA) General Conference announcing a major initiative to begin a nuclear fuel assurances program using \$50 million donated by Warren Buffet to support work on nuclear fuel assurances. His speech called on the international community (or members thereof) to provide a two to one match in funds or the equivalent amount of Low Enriched Uranium (LEU) fuel to start a fuel bank intended to discourage new countries from developing an indigenous nuclear fuel cycle. On December 4, he also took part in discussions with a visiting North Korean delegation from the UN mission. Among the proposals under discussion was the option of converting the Korean de-militarized zone into a wildlife sanctuary. Senator Nunn called attention to the many economic benefits of such a proposal for North Korea. The visit, although informal, may hold great significance for revealing North Korean intentions and diplomatic postures.

In March, the Extended Senior Panel of the LNWFZ-NEA met in Shanghai, China to discuss the confidence building measures necessary to advance these track II (non-governmental unofficial) negotiations. The March meeting marked a crucial advance as it was the first of these meetings to be attended by representatives from the DPRK. Attempts to gain the attendance of an important member of the Chinese Foreign Ministry, Dr. Yang Xi-Yu were also successful. Representatives and observers from ten countries (China, North Korea, South Korea, Mongolia, Russia, the United

States, Japan, Argentina, Finland, and France) met over four days to discuss prospects for the denuclearization of the Korean Peninsula, the need to strengthen the NPT system, and the prospects for *detente* between the US and North Korea. Dr. Endicott, introducing the Program's research initiative on bolstering the NPT, proposed the notion that a close examination of the NPT Treaty and broader nonproliferation regime had to be considered to find ways to maintain member buy-in while preventing new proliferation.

In November, Dr. Endicott and Bernard Gourley participated in a workshop coordinated by the US Air Force's Counter-Proliferation Center that sought to develop metrics for evaluation of the Department of Defense's (DoD) readiness to engage in consequence management operations. The event was sponsored by a grant from the Defense Threat Reduction Agency (DTRA), and had a two-fold purpose of rating the DoD's current capabilities in consequence management and then producing a series of recommendations for new metrics that could be used evaluate consequence management readiness as part of an effort to revise DoD policy in this field.

On November 17<sup>th</sup>, Dr. Endicott and the Center for International Strategy, Technology, and Policy hosted the Uzbekistani Ambassador to the United States, Ambassador Abdulaziz Kamilov, and the Deputy Minister for Renewable Energy, Dr. Gulnara Rashidova. The Ambassador and Deputy Minister were given a number of briefings on research being conducted at Georgia Tech on renewable energy sources. Among those addressing the Ambassador was former Sam Nunn Security Fellow Tommer Ender who is doing work with Dr. Comas Haynes of Georgia Tech's Center for Innovative Fuel Cell and Battery Technologies. Other briefers were invited from Georgia Tech's Strategic Energy Institute, a research center that considers a wide range of innovative technologies to ensure stable energy supplies into the future. The purpose of the Ambassador's visit was to gain new ideas about how his country might best cope with the challenge facing his nation with respect to how to least expensively provide electricity for a population that is spread out in small settlements over a large area.

In November 2006, CISTP gained State Department approval for two members of North Korea's United Nations mission to attend briefings about possible solutions to the ongoing nuclear crisis that were presented by program fellows and Graduate Research Assistants (GRAs.) The North Korean representatives were Minister Kim Myong Gil and Counselor Jo Kil Hong of the North Korean



Foreign Ministry. During the course of their visit, Minister Kim and Counselor Jo met with Senator Nunn, Ambassador John Kelly, Dr. John Hardman of The Carter Center, retired CIA analyst Ms. Merrily Baird, as well as numerous faculty and staff of the Sam Nunn School. On the second day of their visit, the North Korean representatives met with fellows of the Sam Nunn Security Program. Of particular concern to the North Koreans was how to sequence confidence building measures and how to resolve the many problems stemming from the lack of trust between the United States and North Korea. They also requested that the fellows comment on how to ensure that US security guarantees could be assured even after the change in US presidential administrations in 2009. Upon conclusion of the meetings, Minister Kim noted that the fellows exhibited an understanding exceeding that of many in the Washington think tanks.

During 2006, Professor Goodman served on a major national advisory committee concerned with IT security and efforts to improve cybersecurity research in the United States. This panel is a project of the Computer Science and Telecommunications Board of the National Academies' National Research Council. Congress funds the panel and has given it the mandate to recommend a comprehensive national R&D strategy for cybersecurity. Dr. Goodman currently serves as the chairperson for the research committee.

In May of 2006, Dr. Goodman chaired a panel at an International Telecommunication Union [ITU] Conference in Geneva on Partnerships for Global Cybersecurity. The ITU is part of the United Nations System, and it exists to bring governments and the private sector together to address standardization, development, and security issues related to global telecommunications networks. This meeting was designed to advance an action line developed as part of the World Summit on the Information Society's (WSIS) plan of action. This particular action line (C5) dealt with the need to build confidence and security in the use of ICTs. WSIS is a UN initiated program of events designed to foster more widespread, more secure, and more collaborative use of information technologies globally. Dr. Goodman's panel was entitled "Perspectives on Promoting Global Cybersecurity", and it included panelists from the European Network Information Security Agency (ENISA), the US State Department, and the European Commission's InSafe initiative.

In his role as co-director of the Georgia Tech Information Security Center (GTISC) Dr. Goodman supports cross-disciplinary research within Georgia Tech and the wider community for developing

solutions for deficiencies in cyber-security. GTISC's vision is to create effective information security through user-centered approaches integrating technology and policy research. Dr. Goodman's June presentation on the African Cybersecurity Project was well received by GTISC members from across the Institute's disciplines.

In November of 2006, two MacArthur Foundation grant recipients, the Georgia Institute of Technology (GT) and Carnegie Mellon University (CMU), coordinated a three week trip to the United States by five IT security officials<sup>1</sup> employed by the governments of Rwanda and Tunisia. The delegation included the Rwandan director of the National Computer Center, and the Director of Tunisia's National Center for Information Security. These officials came to the US with the blessings and financial support of their respective governments. SNSP GRAs Danika Schmitt and Christopher LaRosa coordinated and facilitated much of the visit. The goal of the project was not only to provide information to the two countries, but to foster collaboration between these two countries. The five participants in the group attended various meetings and workshops at CMU, GT, and in Washington, DC that were designed to give them additional tools for creating or enhancing their respective national information and cyber security capabilities. At CMU, they met with several faculty members to discuss cybersecurity and policy. Additionally, they met with members of CMU's Computer Emergency Response Team (CERT) and Cylab. In DC, they met with the Department of Commerce, the Stanford Research Institute (SRI), the SysAdmin, Audit, Network, Security (SANS) Institute, the World Bank, and USAID. They also attended the Continuing Legal Education (CLE) conference sponsored by Georgetown University. In Atlanta, they met with the producers of CNN's *Inside Africa* who interviewed Dr. Raphael Mmasi for a short segment on information security in Africa. They also met with the British Standards Institution (BSI)/eFortresses, the Georgia Tech Information Security Center (GTISC), Georgia Tech's Office of Information Technology (OIT), the FBI's Cybercrimes Unit, and IBM Internet Security Systems (ISS). Additionally, they spent time with Dr. Best and his Africa-focused ICT research groups.

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<sup>1</sup> The five visitors were: 1) Nabil Sahli, Director of the Tunisian Computer Emergency Response Team (CERT-TCC), Professor of Computer Science at the University of Tunis, and CEO of the National Agency for Computer Security, 2) Naoufel Frikha, Government of Tunisia, Deputy Director of the National Agency for Computer Security, 3) Haythem El Mir, Government of Tunisia, National Agency for Computer Security, 4) Dr. Raphael Mmasi, Government of Rwanda, Director of the National Computer Center, Deputy Director of the Rwandan Information Technology Authority (RITA), and 5) Patrick Nyirishema, Technology Specialist at the Rwandan ICT park at the Rwandan Information Technology Authority (RITA).

The current information security initiatives of the Rwandans flowed directly out of the visits by Professors Goodman and Best to Rwanda as well as the Rwandan's visit to the US. During these visits the need for a national information security capability became apparent. The visits also aided the Rwandans in acquiring some of the tools needed to build this capability, including a unique relationship with Tunisian information security experts that resulted in a transfer of technology between the two countries. Also as a result of the visits, a national cyber security response center was set up and made operational by the Rwanda Information Technology Authority (RITA) and the National Computing Center (NCC). Additionally, two new information security specialists were recruited and hired to develop and deploy various security tools as well as to develop and implement an awareness campaign about information security threats. Tunisia also participated in collaborative efforts with Rwanda that consisted of sending a technical expert from the National Agency for Computer Security (ANSI) in Tunisia to Rwanda to share his experiences about how to establish a national agency for information security in addition to training Rwandan technical specialists on various security tools. The technical expert from ANSI, Mr. Haythem El Mir, also shared his experiences with developing a national ICT security plan as well as material for a national information security awareness campaign.

Currently, RITA is working to establish a national cyber security lab. At this stage of development, they are working on the technical specifications for the required equipment needed to establish the lab. The equipment will be put into two research labs at the national level; one of which will be hosted at the President's office and the other will be hosted at the Rwandan national computing center.

One of the challenges that RITA is facing is engaging the stakeholders in information security and gaining their participation in these issues. Since the trip in November, two working groups have been established and are currently operational. The first is a security team that deals solely with technical issues and is composed of one of the technical staff from each ministry and public institution. This group has progressed well. The other is an information security tactical group that deals primarily with policy, strategy, and guidelines with the ultimate goal of developing a national strategy on cyber security, which has unfortunately taken much longer than expected. The biggest challenge that the tactical group has faced is the difficulty of coordinating their efforts with the relevant policymakers who are rarely available for discussion and consultation.

Additionally, Professor Benoît Morel of CMU has aided Rwanda in beginning a collaborative partnership with Symantec. The purpose of this relationship is to negotiate a competitive agreement between Symantec and the Government of Rwanda for the bulk purchase of anti-virus software and solutions. The Government of Rwanda is also negotiating to receive Symantec sponsored training to build national capabilities in cyber security. As of May 2007, these negotiations were well under way and included high level officials from the Government of Rwanda, the World Bank, RITA, and CMU.

Another project funded by the World Bank is recruiting an information security expert and consultant to assist RITA and the NCC in building national capabilities in cyber security. This position was advertised publicly and a short list of potential candidates was developed- one from the United Kingdom and one from India. One of the candidates is expected to be selected by the end of May 2007, and to start towards the end of June 2007, providing consultancy services for a period of 40 man days. Lastly, RITA is planning the launch an information security awareness campaign aimed at informing the technical staff of the various ministries and public institutions in Rwanda starting the third week of May 2007.

Tunisia is a more advanced state in terms of information security, and already has a fairly robust national information security capability, but it was helped through these visits in other ways. For example, planning is currently being conducted for a major week long conference on policy advisement and how to go about developing national information security capabilities, specifically in African countries. The tentative plan is for this event to occur in the Fall of 2007, and it will be an International Telecommunication Union (ITU) officially sponsored meeting with co-sponsorship by the Georgia Institute of Technology, Carnegie Mellon University, and the Tunisian Computer Emergency Response Team.

At the June 5<sup>th</sup> Intelligence Science Board's *Workshop on the Future of Science and Technology: Implications for Security*, Dr. Goodman spoke on the differences between covering international S&T developments during the Cold War and today. The Intelligence Science Board is an advisory panel to the US Intelligence community on issues of science and technology.

Also in June, Dr. Goodman chaired a panel at the African Senior Leadership Conference that included Mr. Daniel Hurley, Director of the Communications and Information Infrastructure Assurance Program at the US Department of Commerce's National Telecommunications and Information Administration, Dr. Morel of Carnegie Mellon University, and himself. Dr. Goodman spoke on "Cyber Security in Africa" at the event, which was held in Atlanta and was covered by CNN. This event focused on the security challenges confronting Africa, and, for the first time, information security specifically. It was hosted by the National Defense University's African Center for Strategic Studies and Georgia Tech's Sam Nunn School of International Affairs from June 11 to June 23, 2006. It was attended by 98 senior military and civilian leaders from 41 African countries, Europe, the US, and various international organizations.

In September of 2006, Dr. Goodman helped organize a workshop as co-facilitator with Nortel's Rod Wallace on "International Internet Governance" as part of the 2006 Research and Development Exchange (RDX) *Workshop on International Collaboration on Cyber Security Research and Development*. The workshop, organized by the President's National Security Telecommunication Advisory Committee (NSTAC), discussed opportunities for collaboration and cooperation on cyber security issues for protection of critical infrastructures.

On September 29, Dr. Goodman attended a breakfast meeting of the Standing Committee on Law and National Security at the American Bar Association. There he met with Paul McHale – Assistant Secretary of Defense for Homeland Defense- when the Assistant Secretary addressed the assembly. Mr. McHale is responsible for supervision of all homeland defense activities performed by the Department of Defense (DoD.) The meeting and address raised DoD perspectives on the legal issues involved with protecting US borders.

Dr. Goodman also hosted, and presented at, the Consortium Meeting of the Institute for Information Infrastructure Protection (I3P) in Atlanta in November of 2006. The I3P brings together experts from academia, federally-funded labs, and non-profit organizations to identify vulnerabilities in the information infrastructure and to consider possible solutions. At the meeting, Dr. Goodman spoke on the international dimensions of cyber-crime. In March of 2007, Dr. Goodman spoke at the International Conference on Critical Infrastructure Protection on international conventions, and the role that they may play in cyber-crime detection and enforcement.

As mentioned above, Professors Goodman and Best undertook an exploratory visit to Rwanda to consider prospective ICT-related projects during May and June of 2006. During the visit they met with the administration of the Kigali Institute of Science and Technology (KIST). At KIST, Dr. Goodman and Dr. Best gave a public lecture to the Minister of Communications and Infrastructure concerning issues involved in building national capabilities in cyber security. Dr. Best gave a similar presentation while at the National University of Rwanda in Butare on May 31st. At the end of the trip, Dr. Goodman and Dr. Best were invited to participate in a national policy planning retreat for ICT with National Information and Communications Infrastructure (NICI) II and ICT-related officials, and to meet with the US embassy officials to present the findings of the trip.

Dr. Michael Best expanded his ICT work in Africa through advisement activities with the governments of Liberia, Rwanda, and, currently in preliminary phases, in Mozambique. He is working in all three countries to assist with ICT and post-conflict reconciliation and reconstruction activities, as well as assisting in the development of national ICT programs and development plans. In Rwanda, Dr. Best continues to work on ICT for national reconciliation, ICT network development, Last Mile Connectivity (through USAID), university capacity building particularly at the National University in Butare and the Kigali Institute of Science and Technology. During the summer of 2006, Dr. Best sponsored year three fellow Mike Sun in his work on designing a national ICT network for Rwanda. In Liberia, Dr. Best is providing high-level advice on the development of an ICT policy and the relevance of such a policy to different political, economic, and social sectors including reconciliation, post-conflict transitions, and reconstruction. His work in that country helped bring about the visit of President Ellen Johnson-Sirleaf to Georgia Tech and launched an ongoing policy and development initiative. In October, Dr. Best returned to Liberia for meetings with the Minister of Posts and Telecommunications and other government officials to discuss the development of the national ICT strategy. In 2006, Dr. Best also worked with the Minister of Science and Technology of Mozambique. His role has been to help in the development of the country's science and technology park and academic networks in communication technologies.

During 2006, Dr. Best was a frequent advisor to agencies of the United Nations, the government of the US, and various governments of Africa. Dr. Best's principle policy inputs to the US government have been via interactions with the US Agency for International Development (USAID). He is

principal investigator for the Innovation Committee of their cross-cutting Internet program, the Last Mile Initiative (LMI). In this role, Dr. Best offers external advice, analysis, and evaluations of LMI projects worldwide. He has been working with USAID and the World Bank in his projects in Liberia and elsewhere. He also is providing inputs to the UN Economic Commission for Europe on ICT activities in Central Asian states within the UN Special Programme for the Economies of Central Asia. Dr. Best is a frequent consultant to the ITU and their Telecommunications Development Bureau. He is a frequent participant in various global ITU consultancies most recently offering policy inputs for a joint ITU / World Bank handbook on emerging Internet technologies. In 2006, he has been offering advice to the US National Academies of Science on African university development.

Dr. Adam Stulberg has produced published works in 2006 and 2007 on issues related to the management of the coming unmanned aerial revolution in the US Air Force. On May 31, he presented the findings of his research to the US Air Force Research Lab/Human Effectiveness Directorate at the Futurist Conference in Dayton, Ohio. His presentation offered policy advice on normalization of the transition and how to optimize the opportunities of Unmanned Aerial Systems in the US Armed Forces.

Year four Sam Nunn fellow Major Michael Shannon (US Army) has been active in an advisory role concerning US nuclear policy and non-proliferation initiatives. Major Shannon's previous posting was on the faculty of the US Military Academy at West Point, and he is currently pursuing a doctoral degree in Nuclear and Radiological Engineering at Georgia Tech. His work has included lending advice on the possible uses of small nuclear power plants by the US Army, as well as work regarding technologies used in treaty verification. Maj. Shannon has attended IAEA events in Vienna with Professor Hertel, and is participating in the SNSP NPT project by lending an analysis of the nuclear industry's perspective on the NPT regime. In September, fellows Dr. Hertel and Michael Shannon attended a special event of the General Conference of the IAEA on nuclear fuel assurances and their role in preventing nonproliferation. This program considered the utility of programs intended to discourage widespread development of full fuel cycle capabilities by new states by providing assurance that they would not be cut off from fuel by a particular supplier nation. Maj. Shannon submitted a commentary for the record of this session urging more focus on the threat of proliferation and less entrenchment of parochial interests. Maj. Shannon was one member of a team

of Sam Nunn Fellows that also included Elizabeth Hill, Laura Draucker, and Jeff King that presented a briefing to members of the DPRK Mission to the UN on a comprehensive strategic policy toward North Korea. Maj. Shannon also participated in a presentation to the Defense Science Board Task Force on Energy (chaired by James Woolsey) on the feasibility and implications of developing small nuclear reactors for use by US ground forces.

Year four fellow Erika Shehan was able to present her research to the Department of Homeland Security (DHS) as a result of her internship with that agency. Her presentation to an invited panel of DHS Science and Technology Staff concerned issues of privacy, technology, and the role of the DHS. She also interacts with policy makers in her capacity as a member of the Association of Computing Machinery Public Policy Committee.

Year four graduate research assistant Christopher LaRosa, under the guidance of Dr. Michael Best and Dr. Seymour Goodman, undertook a study of new Nigerian regulations that make cybercafé owners responsible for fraud perpetrated by their customers. The measure, which is an attempt to curb email scams originating in Nigeria, raises issues surrounding privacy, common carriage regulation, and private-sector responsibilities with respect to law enforcement. Actions mandated by industry actors that were cooperating with the government included cyber-cafe patron registration, complete monitoring and logging of patron activity, and a nighttime curfew on cybercafé operation. Many cybercafés deemed these measures to be draconian. LaRosa traveled to Lagos, Nigeria in March 2007 and met with federal law enforcement officers, telecom industry officials, and cybercafé operators to determine how the new regulations are being received by industry actors and how useful they have been in curbing fraud. During his visit, LaRosa piloted a survey of cybercafé operators that measures their awareness of the new regulations, their compliance with the government and industry mandates, and their attitudes toward their newly assigned roles as regulators of their patrons' behavior. The survey also measured their knowledge of software tools that would address their day-to-day problems in conducting business and asked them to identify functionality that could be added to new tools to help run their business better. This pilot was the start of an ongoing survey that will canvas café operators in three unique Lagosian neighborhoods to look for similarities and differences both in operator responses to the new laws and operator needs.



Second year fellow Dr. Chris Scholz served with the International Microwave Symposium, Microwave Technologies and Techniques (IMS/MTT) conference. Scholz participated in the DARPA TEAM (Technology for Efficient Agile Mixed Signals Microsystems) program and attended the TEAM Principal Investigator meeting. He had the opportunity to propose ideas to the DARPA's Microsystems Technology Office, and may do future work with that agency.

Senior fellow Dr. Man-Sung Yim participated in the actions of the Nuclear Nonproliferation External Steering Committee at Idaho National Laboratories (INL) in 2006. Dr. Yim is among six committee members - two of whom are from the policy community. The committee evaluates the program plan for INL's nuclear nonproliferation initiatives to ensure it is advancing their five-year non-proliferation research development goals. It also provides program plan personnel with suggestions for how to better strengthen and implement the plan in accordance with the Department of Energy's (DoE) criteria for non-proliferation research in advanced nuclear technologies.

Dr. Tony Rutkowski, Vice-President for Regulatory Affairs at Verisign and Distinguished Senior Research Fellow of the Program, actively advises worldwide on information and telecommunications policy development. He actively supports the cyber security research initiative of the Sam Nunn Security Program. In December, Dr. Rutkowski was appointed to the new Warning Alert and Response Network (WARN) Act advisory committee and has since participated in its first meetings. In the area of identity management, he participated in meetings of Siemens Communications at Munich, the US Telecom Association Summit in Washington, DC, and numerous meetings of the ITU. He helped draft the Alliance for Telecommunications Industry Solutions Technology and Operations (ATIS TOPS) council charter in October. With respect to Radio Frequency Identification (RFID) technologies – used for tracking containers – Dr. Rutkowski presented research at a February ITU workshop in Geneva and again at the ITU Telecommunications Standardization Sector study group's 17<sup>th</sup> meeting in April. For emergency messaging services, he has contributed to the FCC and the ITU through *ex parte* briefings and workshops in Washington and Geneva.

In the field of lawful interception in cyber-crime policy, Dr. Rutkowski has contributed to efforts in the United States and Europe. In May, he contributed to the Intelligence and Surveillance Systems Conference at Washington, DC. He has filed opposition points with the FCC, and offered *ex-parte*

briefings to that same organization. He has also briefed Congress through the DeWine brief and encouraged security measures through the Organization for the Promotion and Advancement of Small Telecommunications Companies. In June, he contributed to the security white paper on Voice over Internet Protocol (VoIP) technologies through the activities of the Global Lawful Interception Industry Forum. This white paper now serves as a government policy reference. In helping ensure the development of the field, Dr. Rutkowski presented to the Washington, DC Bar in November.

With respect to direct participation within the security community, Dr. Rutkowski contributed to the first network security workshop of the European Telecommunications Standards Institute during its meeting in January. He has presented to the FBI's Information Technology Study Group and offered a tutorial to NSTAC on both security and research issues. He has also contributed to the American Association for the Advancement of Science (AAAS), a premier organization serving the educational, leadership, and professional needs of an international body of 10 million science professionals, during their workshop in February.

Dr. Rutkowski has advised the Telecom Regulatory Authority of India on Next Generation Network issues and helped draft the Verisign VoIP regulatory handbook. He contributed to the ITU's New Technology Workshop and to their next generation network regulatory group. At the end of 2006, he was the keynote speaker and served on five panels at the biannual *Intelligence and Surveillance Systems* conference. He also traveled to the ITU in Geneva to advance a framework plan for a common global directory for discovery and access.

## **Outreach**

Outreach to Georgia Tech and the greater Atlanta community is a crucial element of the mission of the Sam Nunn Security Program. This outreach fosters public and academic interest and draws attention to critical issues at the intersection of science and international security. Program outreach is intended to raise awareness of the policy implications of new developments in science and technology. Significant events during the reporting period include continuation of the successful Southeast Roundtable on Defense (SEROD) public speaker series, the Second Biennial Sam Nunn - Bank of America Policy Forum, panel events concerning the protection of critical infrastructures and

preparedness for bioterrorism or dirty bomb attacks, and a visit by the President of Liberia, Ellen Johnson-Sirleaf.

The SEROD speaker and luncheon series continued in 2006 with several events in both the spring and the fall. The SEROD series for this period began with January's presentation by Dr. Gary Samore of the MacArthur Foundation on the Iranian proliferation issue. That program had high attendance and raised pointed issues about policy options available in addressing nuclear proliferation in Iran. In February, Dr. David Shambaugh spoke on Sino-European relations and their impact on US foreign policy- with particular reference to the potential for Europe to end the arms embargo against China. The final spring semester SEROD was Ambassador John Kelly's talk about US relations with the Islamic World in his presentation on "Iraq, Islam, and America's Role in the Middle East." Ambassador Kelly returned in August and presented his perspective on America's Role in the World, which serves to give the fellows an overview of the challenges faced by the US in its role as a superpower. On September 8, Douglas Silliman, Director of the Office of Southern European Affairs at the State Department, presented a long-range perspective on Turkish-European relations in his presentation: "From Ottoman Empire to the EU: Turkey and Southern Europe." The final SEROD of 2006 took place in November with the timely presentation entitled "Nuclear Nonproliferation and Counter-proliferation" by retired General Eugene Habiger. In March of 2007, Dr. Kennette Benedict of the *Bulletin of the Atomic Scientists* delivered the final SEROD of the reporting period. SNSP will continue to use the SEROD series in the new period as a means to engage the local community, starting with Dr. Eric Norman on April 12<sup>th</sup> speaking about the latest technologies used to scan shipping containers for fissile material.

Other events that were sponsored by SNSP affiliated personnel took place during the year as well. For example, in February, the "Woodruff Colloquium" series held an event hosted by Professor Hertel that presented perspectives on nuclear energy. The Nuclear Energy Counselor, Regis Babinet, of the Embassy of France gave a presentation on the French and broader European perspective on nuclear energy programs.

On March 7<sup>th</sup>, the Nunn Program hosted a half-day conference on *Public Health Responses to Weapons of Mass Destruction*. The event brought experts from the Centers for Disease Control (CDC) to speak about the challenges of responding to terrorist attacks or other events involving the

release of chemical, biological, nuclear, or radiological (CBRN) materials. Dr. Armin Ansari spoke on the public health consequences of nuclear and radiological emergencies, and the CDC's roles and responsibilities in responding to such events. Commander Jeffrey Nemhauser presented a medical approach to responding to a radiological emergency. Speaking on the threat of biological terrorism and pandemic disease, Dr. Joanne Cono reviewed the "Big Six" Category A biological agents and how they are treated. Concluding the program, Dr. Susan Gorman spoke about the distribution plans for the strategic national vaccine and medicinal stockpile.

SNSP co-hosted the biennial Sam Nunn - Bank of America Policy Forum on March 27, 2006. Entitled *The Impact of Information and Communication Technologies on Economic Development, National Competitiveness, and Social Justice*, the Forum addressed ICT policy and its implications, particularly for societies in the developing world. The Forum explored issues related to the potential pitfalls of the global network of ICTs through presentations and workshops. The theme of the presentations revealed that potential dangers and problems in ICT development must be systematically investigated if the full potential of global ICTs are to be realized. Several past and present fellows of the program presented posters at the Forum that were viewed by Senator Nunn and a number of distinguished guests from the policy-making community [A list of the posters presented is included as Appendix D]. The 2006 Sam Nunn Forum served as the beginning of a multiyear research initiative on the tension between the promise and peril of global information and communication technologies. Drs. Goodman, Best, Breznitz, and Long were integrally involved in the planning for this event.

Following the Forum, many delegates remained for an extra day (March 28) to take part in a SNSP sponsored roundtable program entitled *ICTs and National Reconciliation*. The keynote speaker at the event was Dr. Julia Steinberger who presented the ICT4Peace Report. Dr. Michael Best moderated a roundtable discussion on country experiences. During this session, the panelists addressed the issues of what defines reconciliation "on the ground," the key challenges to reconciliation, and what may be the role for ICTs in national reconciliation processes. Professor Goodman moderated the event and led the wrap-up session concerning "What do we know, what do we need to know about ICTs and National Reconciliation, and where do we go from here?" Sam Nunn School Chair, Dr. William Long, participated in the panel for the roundtable discussion at the event.

On April 18, SNSP co-hosted the “Global Health and Security Initiative” meeting entitled *Prevent, Detect, and Respond: Preparing for Pandemics and Other Biological Threats*. Senator Nunn and Ted Turner, Co-Chairmen of the Nuclear Threat Initiative, convened and sponsored the event. The centerpiece of the event was a panel discussion attended by Dr. Nicole Lurie, Senior Natural Scientist at the RAND Corporation, Dr. J. Patrick O’Neal, Medical Director at the Georgia Division of Public Health, Dr. James W. LeDuc, Influenza Coordinator at the CDC, and Mr. Charles Lathram, Vice President for Security and Business Control at Bell South. The panel addressed questions involving the current biological threats facing the US and the world and how government and private sector actors could best address these concerns in order to prevent, or rapidly respond to, a catastrophe.

Related to the Global Health and Security Initiative, is an ongoing outreach program begun as a result of the 2004 Sam Nunn Forum on Public-Private Partnerships for Emergency Preparedness. The Partnership Roundtable, during which different members present updates on their activities and seek support for new initiatives, met throughout 2006. The group’s purpose is to connect academic, private sector, and government resources in order to set up working plans for coordinated emergency response to bioterrorism attacks or pandemic diseases. Building on emergency response exercises conducted in early 2006, the Partnership Roundtable has drafted an initial proposal for addressing anthrax terrorism including the use of public facilities such as the Georgia Tech Coliseum as a vaccine distribution center. The final meeting of the year took place on October 24<sup>th</sup>. Dr. Bill Hoehn of the Sam Nunn Security Program spoke on possible approaches to identifying and organizing multi-lingual resources through the private sector and universities to translate and disseminate government, treatment, and organizational information in the event of a terrorist or biological emergency. Other presenters included Dr. Susan Lance, Georgia’s state epidemiologist, speaking on the threat of Avian Flu, the CDC foundation’s Dr. Gene Matthews discussing ongoing efforts to amend “Good Samaritan” Laws in Georgia and North Carolina to protect private businesses from litigation for their assistance in an emergency, and a report from the Atlanta Chapter of Business Executives for National Security on the organization of a private sector “Operations Center” that would work with Georgia’s Emergency Operations center to provide assistance from the private sector in an emergency.

In June, Dr. Endicott delivered a lecture on the topic of global nonproliferation regimes and the LNWFZ-NEA at “Johnny Appleseed II”, a workshop on combating WMD that was conducted in Atlanta. In addition to about twenty military educators from the various educational institutions of the four branches of the military, five SNSP affiliated personnel attended. The purpose of this event was to educate instructors who teach about nonproliferation, counterproliferation, and the nature of the WMD threat. The primary host of the event was the US Air Force’s Counter-Proliferation Center (USAF-CPC), with which our program has a continuing relationship and an on-going collaboration.

On September 13, Dr. Best planned and coordinated a visit by President Ellen Johnson-Sirleaf of Liberia to Georgia Tech. The visit included a public lecture by President Sirleaf on “The Role of Information and Communication Technologies in Liberian Development,” and a private luncheon hosted by Dean Rich DeMillo of the College of Computing. During the luncheon, the Open Society Initiative for West Africa (OSIWA), the Microsoft Unlimited Potential Program and the World Bank Global Information and Communication Technologies Department announced new initiatives for the reconstruction and development of Liberia.

As a recipient of MacArthur grant funding, SNSP was honored to assist Atlanta’s Carter Center in hosting the September 18-20 Peace and Security Funders Group (PSFG) meeting. PSFG is an association of public and private grant-making foundations, trusts, and other philanthropic organizations and individuals committed to supporting research and policy initiatives involving international security. The Sam Nunn School of International Affairs hosted a reception for (PSFG) members during the course of the three-day meeting.

Also in September of 2006, the Program co-hosted a panel event on critical infrastructure protection with Women in International Security (WIIS.) The three speakers addressed the transportation, emergency response, and public health infrastructures. Cathleen Berrick, the Director of the Homeland Security and Justice Issues team at the Government Accountability Office (GAO) spoke about the threats to the various elements of the national transportation system. Dr. Melissa White spoke about the limitations of the Emergency Medical System to cope with mass casualty events. Dr. White is Medical Director for the College Park Fire Department and EMS, an Assistant Professor of Emergency Medicine at Emory’s School of Medicine, and the Associate Medical Director for Emory Flight. Dr. Terrence O’Sullivan, a researcher at the University of Southern

California's Center for Risk and Economic Analysis of Terrorism Events (CREATE), spoke on the subject of the public health community as a critical infrastructure at high risk. Although considerable resources have been committed to securing these vulnerable assets, they are not yet fully secured and remain a key weakness in America's homeland security.

# Appendices

## **Appendix A: Biographies**

### **Principal Investigators**

#### **Professor John Endicott**

John Endicott is Professor at the Sam Nunn School of International Affairs at Georgia Tech, and is Director of the Center for International Strategy, Technology, and Policy. He received his Ph.D. in International Affairs from the Fletcher School of Law and Diplomacy in 1974. His published works include *Japan's Nuclear Option*, *The Politics of East Asia*, *American Defense Policy*, *Regional Security Issues*, and *U.S. Foreign Policy: History, Process, and Policy*. He has served as the Chairman of the Interim Secretariat of the Limited Nuclear Weapons-Free Zone for Northeast Asia (LNUWFZ-NEA) since 1996. Both Prof. Endicott and the Limited Nuclear Weapons Free Zone for Northeast Asia Program were nominated for the 2005 Nobel Peace Prize. Dr. Endicott is a retired Colonel of the United States Air Force where he held posts at Air Force Headquarters in the Pentagon, was Deputy Air Force Representative to the Military Staff Committee of the Security Council, the United Nations, and was Associate Dean of the National War College. As a senior civilian, he was Director of the Institute for National Strategic Studies, serving both the Secretary of Defense and the Chairman, Joint Chiefs of Staff.

#### **Professor Seymour Goodman**

Seymour (Sy) E. Goodman is Professor of International Affairs and Computing at the Sam Nunn School of International Affairs and the College of Computing, Georgia Institute of Technology. He also serves as Co-Director of the Center for International Strategy, Technology, and Policy and Co-Director of the Georgia Tech Information Security Center. Prof. Goodman studies international developments in the information technologies and related public policy issues. In this capacity, he has published well over 150 articles and served on many government and industry advisory and study committees. He has been the International Perspectives editor for the *Communications of the ACM* for the last seventeen years, and has studied computing on all seven continents and more than 80 countries. Immediately before coming to Georgia Tech, Prof. Goodman was the director of the Consortium for Research in Information Security and Policy (CRISP), jointly with the Center for International Security and Cooperation and the School of Engineering, Stanford University. He has held appointments at the University of Virginia (Applied Mathematics, Computer Science, Soviet and East European Studies), The University of Chicago (Economics), Princeton University (The Woodrow Wilson School of Public and International Affairs, Mathematics), and the University of Arizona (MIS, Middle Eastern Studies). Prof. Goodman was an undergraduate at Columbia University, and obtained his Ph.D. from the California Institute of Technology where he worked on problems of applied mathematics and mathematical physics.

### **Affiliated Faculty**

#### **Assistant Professor Michael Best**

Dr. Michael L. Best is Assistant Professor with the Sam Nunn School of International Affairs and Adjunct Assistant Professor with the College of Computing at Georgia Tech. In addition, he is a



Fellow of the Berkman Center for Internet and Society at Harvard University and Research Affiliate with the Center for Technology, Policy, and Industrial Development and the Program for Internet & Telecoms Convergence at the Massachusetts Institute of Technology (MIT). He is co-founder and Editor-in-Chief of *Information Technologies and International Development*. He serves as a consultant to the World Bank, the ITU, and US AID. He was hired with funds initially provided by the MacArthur Grant. He holds a Ph.D. from the MIT Media Lab, where he has served as head of the e-Development group and Director of Media Lab Asia in India.

Dr. Best's research focuses on the role of computers and communication in social, economic, and political development. He studies the Internet and Internet enabled services in low-income countries of Africa and South Asia. His current interests include studies of terrestrial wireless infrastructure, the role of sustainable energy sources for rural Internet, and the role of the Internet in post-conflict settings and as a tool for peace, reconciliation, security, and democratization. Professor Best's work encompasses the engineering of new technologies, public policy interventions, and social and economic assessments.

#### **Assistant Professor Dan Breznitz**

Dr. Breznitz is Assistant Professor of Science, Technology, and International Affairs at the Sam Nunn School. A native of Israel, he has published work on the role of the Israeli military in developing the software industry. His most recently published book concerns development strategies for developing hardware and software information technology industries in Ireland, Israel and Taiwan. This book, *Innovation and the State-Development Strategies for High Technology Industries in a World of Fragmented Production*, explores both the successful and unsuccessful tactics employed by each of these country's respective governments. His current interests are leading him to research in greater depth the issues of technology, development, and national security, specifically in relation to the globalization and internationalization (off-shoring) of national R&D projects.

#### **Professor William Hoehn**

William (Bill) Hoehn serves as Visiting Professor at the Sam Nunn School of International Affairs. He has been the Coca-Cola Foundation Eminent Practitioner in Residence at Georgia Tech since 1997. Dr. Hoehn earned his Ph.D. in econometrics from Northwestern University and did post-doctoral research at the Netherlands Econometrics Institute in Rotterdam. Prior to his affiliation with Georgia Tech, Dr. Hoehn served in both the Legislative and Executive branches of the Federal government, and as a researcher and executive at RAND. From 1984 to 1997, Dr. Hoehn served as a senior professional staff member of the Senate Armed Services Committee, with responsibilities for arms control, strategic weapons programs in both the Departments of Defense and Energy, and defense strategy and policy. He was also a senior policy advisor to Senator Nunn.

Dr. Hoehn was the Principal Deputy Assistant Secretary of Defense for International Security Policy from 1982 to 1984. He was primarily responsible for the Secretary of Defense's Emerging Technologies Initiative to enhance cooperation with our NATO allies on defense technologies. He also served as the lead Defense Department representative to the Hot-Line Upgrade negotiations with the Soviet Union, and contributed to both the INF and START negotiations. Prior to his government service, Dr. Hoehn was a research professional, research manager, and vice-president of The RAND Corporation. While at RAND, he was the author or co-author of a number of classified and unclassified studies and briefings on both economic and national security issues.

**Professor William Long**

William (Bill) Long is Professor and Chair of the Sam Nunn School of International Affairs at the Georgia Institute of Technology. He has previously served as Associate Chair of the School of International Affairs, and as Co-Director of the European Center of the University System of Georgia. Dr. Long is the recipient of research, teaching, and institution building awards from the Council on Foreign Relations, the William and Flora Hewlett Foundation, the Pew Charitable Trusts, the John D. and Catherine T. MacArthur Foundation, the Fulbright Commission, the European Union, and the U.S. Department of Education. Dr. Long's current research focuses on conflict resolution following civil and international war. In addition, Dr. Long's research focuses on international trade and technology transfer and their relationship to national security, economic competitiveness, and international cooperation. In this regard, he has authored two books, *Trade and Technology Incentives and Bilateral Cooperation*, and *U.S. Export Control Policy* as well as numerous articles and book chapters.

**Dr. Anthony Rutkowski**

Anthony (Tony) Rutkowski is currently the Vice-President for Regulatory Affairs within the Communication Services Division at VeriSign, Inc. - the leading global provider of trusted infrastructure and identity services for the Internet, telecommunications, and e-commerce sectors. He is also a Distinguished Senior Research Fellow of the Center for International Strategy, Technology, and Policy at Georgia Tech. In his 40 year of work, he has been employed by: General Magic, Sprint International, Horizon House, Pan American Engineering, General Electric, the Evening News Association, the Federal Communications Commission, the International Telecommunication Union, Cape Canaveral City Council, the Internet Society, MIT, and NY Law School, as well as consultancy with NGI Associates.

He is an engineer-lawyer who extensively uses and innovates with many of these technologies, and he developed a career from following strategically important developments and turning them into business opportunities. He currently serves President of the Global LI Industry Forum and participates in numerous Lawful Access and Interception forums. He also participates on the advisory boards for *Telecommunications Policy* and *Info* magazines.

**Associate Professor Adam Stulberg**

Dr. Stulberg is an Associate Professor of International Affairs at Tech. His research interests are in international security and the foreign policies of Russia and other former Soviet countries. He recently served as a Senior Research Associate at the Center for Nonproliferation Studies of the Monterey Institute of International Studies, where he drafted policy recommendations and background studies on future directions for the US Cooperative Threat Reduction Program in Russia and Eurasia. He is also a political consultant to the RAND Corporation. He has published book chapters and articles on Russian arms sales, Russian military R&D, and Russian national security policy making. His current research interests involve management of the revolution in military affairs and the transition to automation in the US military, as well as nuclear control and security issues.

## **Program Manager**

### **Bernard Gourley**

Bernard Gourley is the program manager for the Sam Nunn Security Program. He holds a Master's degree in International Affairs from Georgia Tech, and is currently pursuing a graduate degree in Economics from Georgia State University. He has been published in the Cato Institute's *Policy Analysis*, the *Journal of Asia Martial Arts*, and has written a number of test preparation books on economics, history, and political science.

## **2005-2006 Fellows and Students**

### **Thomas Backes**

*Pre-Doctoral Fellow*

*Specialization:* Electrical and Computer Engineering

Thomas Backes is a pre-doctoral fellow from the School of Electrical and Computer Engineering. He received a Bachelor's (BS) degree in Electrical Engineering (2002) and Masters' (MS) degrees in Electrical and Computer Engineering (2003) and Mathematics (2005), all from the Georgia Institute of Technology. He is currently a PhD student with the Nano and Ultrafast Photonics Laboratory, where he researches terahertz technology and nanoplasmonics. In 2004, Thomas was named a student fellow in Georgia Tech's Nanoscience and Technology Program. Thomas also previously spent a year working in the U.S. House of Representatives as a page, and he hopes to return to a job in government service where he can use his science and international security studies background to improve American competitiveness in trade and technology.

*Research Project:* The Threat and Opportunity of Globalization

### **Patrick Biltgen**

*Pre-Doctoral Fellow*

*Specialization:* Aerospace Engineering

Patrick Biltgen completed his BS and MS in Aerospace Engineering at Georgia Tech in 2003 and 2004. He is a pre-doctoral fellow of the program and is a graduate researcher with the School of Aerospace Engineering at the Georgia Institute of Technology. His interests include system-of-systems design and capability-based analysis. Mr. Biltgen was the team leader for the first place 2003 American Institute of Aeronautics and Astronautics (AIAA) Undergraduate Team Engine Design competition and the 2004 AIAA Graduate Strategic Missile Design Competition. His current research focus is the development of a decision making and optimization methodology for a long-range strike system.

*Research Project:* Policy Implications for Complex System-of-Systems Design

### **Thomas Caulfield**

*Pre-Doctoral Fellow*

*Specialization:* Chemistry

Thomas Caulfield is a pre-doctoral fellow earning his Ph.D. in Chemistry from the School of Chemistry and Biochemistry. His research involves computational biochemistry and structural biology. In his work with the mechanisms of macromolecules, such as the functional ribosome, he seeks knowledge that could be used to develop new prophylactic medicines or agents applicable to national security issues.

Research Project: Analyzing the Mechanism of Inhibition of the Sarcin-Ricin Loop Region of the Ribosome from Ricin Binding: competitive binders and blocking agents

### **Reagan Charney**

*Pre-Doctoral Fellow*

*Specialization: Organic Chemistry*

Reagan Charney is a PhD student with the School of Chemistry. Her research focuses on the synthesis of homogenous catalysts and optimization of those reactions in order to reduce waste and improve efficiency. She also works to synthesize tetrazole derivatives that can be used in propellants, explosives, and fire resistant paints. In the future, she aims to work as an analyst and is interested in the CIA. She earned her BS in chemistry at Texas A&M University in 2001 and was a high school chemistry & physics teacher in South Carolina before coming to graduate school.

Research Project: Sustainable Technology for National Security

### **Shelby Highsmith**

*Pre-Doctoral Fellow*

*Specialization: Mechanical Engineering*

Shelby earned a BS in Aerospace Engineering from Notre Dame in 1997 and his MS in Materials Science and Engineering from Georgia Tech in 2003. Currently, he is a mechanical engineering doctoral candidate and a pre-doctoral fellow. His research interests include material mechanics and fatigue. His background in aerospace engineering and defense contracting has led him to seek a role in the management and non-proliferation of weapons technology in particular regarding the nuclear standoff with Iran.

Research Project: The Strategic Implications of Advanced Anti-Ship Cruise Missiles in US Foreign Policy

### **Jonathan McGrath**

*Pre-Doctoral Fellow*

*Specialization: Chemistry*

Jonathan McGrath obtained his PhD in Chemistry in 2006. After graduation he took a position with the US Department of Homeland Security in Houston as a chemist conducting forensic work in support of the mission of Customs and Border Patrol. His research at Georgia Tech involved the synthesis and characterization of spherical, thermoresponsive nanoparticles for fabrication of colloidal crystals via self-assembly. These crystals can be used to produce optical devices, such as optical tags that can be made stealthy by diffracting infrared light. His research also involves the production of particles with a core/shell (or "onion-like") morphology, whereby the different sections possess different functionalities. These core/shell materials are being explored for their applications in drug delivery, nanoreactors, and sensor technologies. Jonathan received his BS in Chemistry from the University of Dallas in 2001 and his MS in Forensic Science at the University of Illinois at Chicago in 2002. His research experiences have included work at the McCrone Research Institute in Chicago, internship with the Illinois State Police, and summer research at the University of Montpellier in France.

Research Project: Novel Sensing Strategies to Detect Hazardous Materials Related to Homeland Security

### **Daniel Moore**

*Pre-Doctoral Fellow*

*Specialization: Materials Science and Engineering*

Daniel Moore is a pre-doctoral fellow who earned his PhD in materials science and engineering in 2006. He currently works for Cree Inc, in the Research Triangle of Raleigh, NC. He received an

A.B. in Physics, Mathematics, and Political Science from the University of Chicago in 2001. Daniel's research interests include the development of nanotechnology – specifically vapor-solid growth mechanisms in nanostructures. He is concerned that the development of nanotechnology could lead to greater separation between developed and developing countries. He is also interested in the potential for technology transfer to less-developed countries.

*Research Project:* Nanotechnology's coming Impact on International Security

### **Courtney Sorrell**

*Pre-Doctoral Fellow*

*Specialization:* Chemistry

Courtney Sorrell is pre-doctoral fellow seeking her PhD in chemistry. Her interests include using microgel thin-films and quartz crystal microbalance for chemical interaction detection sensors, which could be used to detect chemical or biological warfare agents. During her undergraduate studies at Emory University (BA, May 2000) she pursued a dual interest in chemistry and political science, which she seeks to further through work in the Sam Nunn Security Program.

*Research Project:* The Impact a Breakthrough in Oil Sands Processing Technology would have on Canadian International Policy and Security

### **Michael Sun**

*Pre-Doctoral Fellow*

*Specialization:* Electrical and Computer Engineering

Michael Sun earned his BS in Computer Science from the University of Michigan at Ann Arbor in 2000. He is a pre-doctoral fellow from the School of Electrical and Computer Engineering. His research work focuses on mobile computing systems and Voice over Internet Protocol (VoIP) security. He is also keenly interested in the use of information & communication technologies for development and its impact on global security issues.

*Research Project:* The nexus between the widespread adoption of open source software and national security in the People's Republic of China

### **Other Students**

#### **Britta Froelicher**

*Graduate Research Assistant*

*Specialization:* International Affairs

Britta Froelicher received a BA in Sociology in May 2000 from Simon's Rock College of Bard in Great Barrington, MA. She has worked in Germany in market research and in international investment banking in the US. Her research interests include Middle Eastern security issues and economic development. Upon graduation, she would like to work on developing cohesive and coherent foreign policy towards the Middle East.

*Research Project:* Implications of the Revolution in Military Affairs

#### **Megan Kirk**

*Specialization:* Industrial Engineering and International Affairs

Megan Kirk currently works for the National Security Agency (NSA.) She completed her dual MS in Industrial and Systems Engineering (with a human-integrated systems focus) and International Affairs (with an information security policy focus) at the Georgia Institute of Technology in 2006. Previously, Megan earned a BS in Industrial and Systems Engineering, a minor in French, and a

certificate in Industrial and Organizational Psychology from the Georgia Institute of Technology, graduating in 2003.

*Research Project:* Examining the avian flu situation from an international systems perspective to identify a network of interconnected components and related policy efforts to protect the homeland

### **Jessica Kirk**

*Specialization:* Industrial Engineering and International Affairs

Jessica Kirk currently works for the NSA. She received her undergraduate degree in Industrial and Systems Engineering from the Georgia Institute of Technology in December 2003. During her undergraduate career, Jessica participated in the Language for Business and Technology French study abroad, received a minor in French, and completed a certificate in Industrial and Organizational Psychology. Jessica is currently completing dual MS in Industrial and Systems Engineering and International Affairs; her graduate studies focus on human-integrated systems within Industrial and Systems Engineering and information security policy within International Affairs.

*Research Project:* Examining the Security Risks of Embedding Radio Frequency Identification (RFID) into Passports and Identification Cards

### **Joseph Reid**

*Specialization:* International Affairs

Joseph Reid currently works for the Joint Warfare Analysis Center. He graduated from Georgia Tech in 2004 with a BS in Mechanical Engineering and completed his MS in International Affairs in 2006. As an undergraduate he worked on two different projects: 1) studying electronic soldering wetting angles and 2) designing a process for embedding electronics within the hull of small vessels. In the summer of 2005, he worked in the Terrorism Emergency Response and Preparedness Division of the Georgia Office of Homeland Security.

*Research Project:* Technology and the Growing Chinese Threat

## **2006-2007 Senior Fellows**

### **Professor Dimitri Mavris**

*Faculty Fellow*

*Specialization:* Aerospace Engineering

Dimitri Mavris is the Boeing Professor of Advanced Aerospace Systems Analysis at Georgia Tech's Guggenheim School of Aerospace Engineering and the Director of its Aerospace Systems Design Laboratory (ASDL). Dr. Mavris teaches classes on advanced design methods, fixed-wing vehicle design, and air-breathing propulsion design, and makes every effort to involve his students in his research in multi-disciplinary analysis, design and optimization, and non-deterministic design theory. Dr. Mavris also sponsors undergraduate design teams such as the AIAA Design-Build-Fly competition. Dr. Mavris has actively pursued closer ties between the academic and industrial communities in order to foster research opportunities and tailor the aerospace engineering curriculum towards meeting the future needs of the US aerospace industry. This has led to a record 20% of ASDL's multi-million dollar annual research budget being derived from industry-sponsored projects. ASDL is a member of the Federal Aviation Administration's Center of Excellence under the Partnership for Air Transportation Noise and Emissions Reduction (PARTNER).

**Dr. Jan Osburg**

*Post-Doctoral Fellow*

*Specialization: Aerospace Engineering*

Dr. Jan Osburg will soon be taking a position with RAND Corp in its Pittsburgh, PA offices. He is currently a research engineer with Georgia Tech's Aerospace Systems Design Laboratory (ASDL). He specializes in aerospace and defense systems design methodology and tools, with a focus on increasing the efficient collaboration of interdisciplinary teams. As part of this research, he has helped ASDL create a next-generation "Collaborative Design Environment" that fosters design team interaction and creativity. Dr. Osburg is the faculty advisor to the Georgia Tech student chapter of the Mars Society. He has been on several crews of the Mars Society's Desert Research Station in Utah and Flashline Mars Arctic Research Station on Devon Island, twice as crew commander, but also as executive officer, health and safety officer, human factors researcher, and station engineer.

*Research Project: Enabling Robust Disaster Communications with Existing Infrastructure*

**2006-2007 Fellows and Students****Santiago Balestrini-Robinson**

*Pre-Doctoral Fellow*

*Specialization: Aerospace Engineering*

Santiago holds a BS and a MS in Aerospace Engineering from the Georgia Institute of Technology. He is currently a PhD candidate in the ASDL under Professor Mavris. He has worked for the Office of Naval Research under the Integrated Reconfigurable Intelligent Systems initiative, in support of the Integrated Engineering Plant program that will enable the development of more capable, survivable surface ships for the US Navy. He is currently conducting research on the Sea Base concept, a central pillar to the US Navy's Sea Power 21 vision. The Sea Base will enable the support of joint operations on a global scale, effectively enabling the US armed forces to exploit the maneuver space that the oceans offer. In order to develop an affordable and comprehensive solution to the problem of supporting global operations, part of the research is focused on studying the relations that the United States can establish with other nations to allow them to field units and traverse their sovereign territory and air space.

*Research Project: Sea Basing, Diplomacy, and the Support of Global Operations*

**Anthony Dickherber**

*Pre-Doctoral Fellow*

*Specialization: Bioengineering*

Anthony (Tony) Dickherber earned his BS degree in Electrical Engineering from Georgia Tech in 1999. He worked for the Georgia Tech Research Institute (GTRI) in their Information Technology and Telecommunications Laboratory for the next 4 years investigating military radio technologies while earning his MS in Electrical and Computer Engineering by 2002. He left in 2003 to pursue his doctorate in the School of Bioengineering at Georgia Tech where his research involves developing novel microelectronic biosensors.

*Research Project: Developing an Understanding of How Terrorist Groups Use the Internet and How it Might be Used Against Them*

**Laura Draucker**

*Pre-Doctoral Fellow*

*Specialization:* Chemical Engineering

Laura Draucker is a PhD candidate in Georgia Tech's School of Chemical and Biomolecular Engineering. She earned her BS in Engineering from Villanova University and is pursuing a minor in Public Policy concurrent with her PhD studies. A member of the American Chemical Society, she has published academic work on vapor-liquid-liquid equilibria and scientific methodology for solubility experimentation. She is currently researching sustainability in the biorefinery industry and seeking practices to make production of biofuels commercially viable.

*Research Project:* Policy and Technological Implications of Moving Away from Oil Refineries and Towards Bio-Refineries (joint research with Elizabeth Hill)

**Elizabeth Hill**

*Pre-Doctoral Fellow*

*Specialization:* Chemical Engineering

Elizabeth Hill received her BS in Chemical Engineering from the University of Rochester in 2003. She is currently a PhD student in the School of Chemical and Biomolecular Engineering at Georgia Tech. Her focus is on specialty separations including homogeneous enzyme recycle for the production of chiral drug precursors and biomass extractions for chemical feedstock and alternative fuels.

*Research Project:* Policy and Technological Implications of Moving Away from Oil Refineries and Towards Bio-Refineries (joint research with Laura Draucker)

**Jeffrey King**

*Pre-Doctoral Fellow*

*Specialization:* Computer Science

Jeff King holds a BS degree in Computer Science from the University of Virginia. He is currently a PhD candidate in the College of Computing at the Georgia Institute of Technology. He previously founded a company providing public key infrastructure (PKI) solutions, and has worked as an information security consultant for clients in the financial and health care sectors. His current research interests are in digital identity management and trusted user interfaces.

*Research Project:* The Utility of One Laptop per Child Programs in Developing Countries

**Kevin Klein**

*Pre-Doctoral Fellow*

*Specialization:* Mechanical Engineering

Kevin Klein is a PhD candidate and Graduate Teaching Assistant in the Woodruff School of Mechanical Engineering. He earned his BS and MS degrees in Mechanical Engineering at Georgia Tech. His research studies micro and nano-film devices as bio-assays in cancer diagnosis. His work in the field will be presented and published at the 2006 International Mechanical Engineer's Congress and Exposition.

*Research Project:* Nanotechnology and the Security Dilemma: The Security Impact of Advancing Sensor and Communication Technologies

**John Melonakos**

*Pre-Doctoral Fellow*

*Specialization:* Electrical and Computer Engineering



John Melonakos is an Electrical and Computer Engineering PhD student studying computer vision algorithms for vision-guided security applications. Previously he worked on biological and chemical warfare agent detectors with Palmar Technologies under a Defense Threat Reduction Agency (DTRA) grant. From 1999 to 2001, John served as a missionary in Maracaibo, Venezuela. John graduated from Brigham Young University in 2004 with a BS in Electrical Engineering.  
*Research Project:* Steganography: Risks and Countermeasures

### **Michael Shannon**

*Pre-Doctoral Fellow*

*Specialization:* Nuclear and Radiological Engineering

Michael Shannon is a Major on active duty in the US Army whose previous posting was on the faculty of the US Military Academy at West Point where he taught physics. He received his BS in Aerospace Engineering from Embry-Riddle Aeronautical University in 1995, and a MS in Aeronautical Science from Embry-Riddle Aeronautical University in 1999. He obtained his MS in Health Physics from Georgia Tech in 2003, for which he completed a thesis entitled *An Illicit Nuclear Material Detection System Based on Photoneutron & Photofission Interactions*. Michael is currently a PhD student in Nuclear and Radiological Engineering in the George Woodruff School of Mechanical Engineering, and is conducting research designed to advance nuclear nonproliferation efforts.

*Research Project:* Limited Nuclear Weapons Free Zones

### **Erika Shehan**

*Pre-Doctoral Fellow*

*Specialization:* Human-Centered Computing

Erika Shehan is a PhD student in Human-Centered Computing at Georgia Tech. She is currently researching social and technical approaches to empower people with little technical expertise to successfully set up and maintain networked technologies in their homes, as well as to help them understand and cope with security and privacy risks associated with daily computing activities. Erika is a member of the Association for Computing Machinery (ACM) US Public Policy Committee, and holds fellowships from the US Department of Homeland Security and the National Science Foundation. She graduated from Purdue University in 2004 with a BS in Computer Science.

*Research Project:* Risk Assessment of Software Interface Design

### **Diana Talley**

*Pre-Doctoral Fellow*

*Specialization:* Aerospace Engineering

Diana is an Aerospace Engineering PhD candidate in the Aerospace Systems Design Lab under the advisement of Dr. Mavris. Diana received a BS in Aerospace Engineering from Texas A&M University in 2003 and a MS in Aerospace Engineering from Georgia Institute of Technology in 2004. She has worked on the conceptual design of a morphing Unmanned Combat Aerial Vehicle (UCAV) concept for Boeing Phantom Works as well as future commercial transport concepts for the Advanced Concepts Group in Boeing Commercial Airplanes. Diana is involved with the development of the Aviation Environmental Portfolio Management Tool (APMT), which is part of a comprehensive suite of software tools for the Federal Aviation Administration (FAA) that will allow for thorough assessment of the environmental effects of aviation. Additionally, as part of the NASA Graduate Student Researcher Program (GSRP) she is focusing on uncertainty modeling pertaining to the design of System-of-Systems.

*Research Project:* An Evaluation of the Strategic Implications of Theatre Missile Defense Systems

## 2006-2007 Graduate Research Assistants

### **Spencer Hubbard**

*Graduate Research Assistant*

*Specialization:* International Affairs, Korean affairs, nuclear non-proliferation

Spencer Hubbard is a graduate of Guilford College with a BA in Psychology and Criminal Justice. He lived in Seoul, South Korea teaching English while studying the culture and language of the Peninsula as well as the politics of the region. While continuing his studies privately before entering school, he worked as a Deputy Medical Examiner in Minnesota. He is currently a graduate student at the Sam Nunn School of International Affairs working with Dr. Endicott with a focus on the Korean Peninsula, East Asian affairs, and nuclear non-proliferation.

### **Christopher LaRosa**

*Graduate Research Assistant*

*Specialization:* International Affairs

Christopher LaRosa is a Master's Student in the Sam Nunn School of International Affairs at Georgia Tech working with Dr. Seymour Goodman and Dr. Michael Best on issues of ICT use and information security. He spent a year as a Thomas J. Watson Fellow investigating the interactions between ICT infrastructure and news media in East Africa, Latin America, and Central and Eastern Europe. He holds a BA in Computer Science from Hamilton College. He has completed a MS in Computer Science and Graduate Certificate in Human Rights at Emory University.

*Research Project:* The Information Security Threat in Africa: An assessment of preparedness (joint research with Danika Schmitt)

### **Michael Murphree**

*Graduate Research Assistant*

*Specialization:* International Affairs

Michael Murphree is a second year MS student with the Sam Nunn School of International Affairs. He earned his BS in 2004 in International Affairs and spent the following year teaching English and translating while studying Mandarin Chinese and Communist Party history in Guizhou Province, China. In December of 2005, he traveled to Ethiopia to research Internet Service Provider deregulation and reform. His research interests include state policy and industrialization, Sinology, and economic development. He completed his MS in December of 2006 and returned to China to perform research under Dr. Dan Breznitz on innovation and public policy in state-level Science and Technology Development Zones.

### **Danika Schmitt**

*Graduate Research Assistant*

*Specialization:* International Affairs

Danika Schmitt, a native of Mechanicsville, Virginia, is a first year master's student in the Sam Nunn School of International Affairs at Georgia Tech, working with Dr. Seymour Goodman on issues of information security. She earned a BS degree in Integrated Science and Technology with a minor in Computer Science from James Madison University in Harrisonburg, Virginia. She interned with Accenture in Reston, Virginia and worked on a project for the Department of Defense and the Defense Logistics Agency. She has traveled to francophone Niger, West Africa several times and participated in humanitarian aid and outreach there, in addition to assisting in translating. Her research interests and career goals focus on secure ICT infrastructure development in developing countries, particularly in North and West Africa.

*Research Project: The Information Security Threat in Africa: An assessment of preparedness (joint research with Christopher LaRosa)*

## **Senior and Alumni Fellows**

### **Professor Nolan Hertel**

*Faculty Fellow 2004-2005*

*Specialization: Nuclear Engineering*

Dr. Hertel received his PhD from the University of Illinois at Urbana-Champaign. Prior to accepting a position as Associate Professor at Georgia Tech, he was an Assistant and an Associate Professor at the University of Texas at Austin. Dr. Hertel is also involved in the measurement of neutron fields and doses in the vicinity of accelerator-based medical facilities and in the development of a personnel neutron dosimeter which will mimic the angular dependence of the newly recommended radiation protection quantity known as an effective dose. His past work in radiological assessment has included performing a health risk assessment for a mixed-waste incinerator, which was funded by the Westinghouse Savannah River Company. He continues to supervise work in radiological assessment related to the decommissioning of the Georgia Tech Nuclear Reactor. Dr. Hertel is also active in shielding research, particularly radiation skyshine, and in computation dosimetry topics such as the generation of dose conversion coefficients.

### **Giovanni Iachello**

*Pre-Doctoral Fellow 2003-2004*

After graduating in Computer Engineering from Padua University (Italy) in 1999, Giovanni worked for an information technology firm providing corporate consulting services in the fields of security management, personal data protection and third generation mobile applications. In 2002 he joined the Computer Science PhD program at the Georgia Institute of Technology, where he continues his research in Information Security, especially in connection to ubiquitous computing applications and human and social issues. In addition to his Security Program fellowship, Giovanni also holds a pre-doctoral fellowship from the National Science Foundation. Giovanni is also a member of the ACM and the International Federation of Information Processing's WG9.6/11.7 *IT-Misuse and the Law*.

### **Professor Narayanan Komerath**

*Faculty Fellow 2004-2005*

*Specialization: Aerospace Engineering*

Dr. Narayanan Komerath is a Professor of Aerospace Engineering at Georgia Tech. He holds a Bachelor of Technology in Aeronautical Engineering from the Indian Institute of Technology – Chennai and an MS and PhD in Aerospace Engineering from Georgia Tech. At Georgia Tech, he has guided over 15 PhDs, won three US Patents and published over 200 papers on problems in propulsion and combustion, fluid dynamics, space concepts, diagnostic techniques and the aerodynamics of rotorcraft. He is a Fellow of the NASA Institute of Advanced Concepts (NIAC) and an Associate Fellow of the American Institute of Aeronautics and Astronautics. He spent the summer of 2004 as an A.D. Welliver Faculty Fellow at Boeing and is currently a Hesburgh Teaching Fellow. As a Senior Research Fellow of the Sam Nunn Security Program, he studies international collaboration models for large space infrastructure projects.

**Benay Sager, PhD**

*Pre-Doctoral Fellow 2004-2005*

*Specialization: Mechanical Engineering*

Benay Sager was born and raised in Cyprus. He is currently an MBA student at Georgia Tech and completed an internship as a Supply Chain Manager at Amgen Incorporated in 2006. Benay also has a BS, MS, and PhD in Mechanical Engineering. His PhD research led to two invention disclosures, one of which is currently being pursued as a patent licensed through the Georgia Tech Research Corporation. From 2002 through 2004, he was an NSF IGERT Research Fellow in the Technological Innovation: Generating Economic Results (TI:GER) program jointly run by Georgia Tech and Emory University. This program produces teams consisting of an engineer, an MBA student, and a law student who work together to take a product idea from the drawing board, through marketing, and into production. Benay's research interests are in manufacturing, rapid prototyping, computer aided design, decision-based design, entrepreneurship and strategy.

**Associate Professor Man-Sung Yim**

*Faculty Fellow 2003-2004*

*Specialization: Nuclear Engineering, Environmental Health Science*

Dr. Yim is Associate Professor and Director of Graduate Programs at the Department of Nuclear Engineering at North Carolina State University and a Sam Nunn Security Faculty Fellow at Georgia Tech. He is Technical Coordinator of the Department of Energy's Office of Civilian Radioactive Waste Management Fellowship at North Carolina State University. Dr. Yim's research area includes nuclear waste management, risk analysis, advanced nuclear fuel cycle analysis, and nuclear nonproliferation. He is a member of Editorial Advisory Board of the Journal, *Progress in Nuclear Energy*, and the American Society of Mechanical Engineers (ASME) Peer Review Panel for the DoE's Office of Science and Technology and has been an invited reviewer for the Nuclear Regulatory Committee's Program Review Meetings. Dr. Yim received a BS and MS in Nuclear Engineering from Seoul National University and a PhD in Nuclear Engineering from University of Cincinnati through a Fulbright Scholarship. He also received SM and ScD in Environmental Health Science from Harvard University.

## **Appendix B: Writings, Presentations, and Professional Activities**

### **Selected Research**

**Balestrini-Robinson, S., D Fulmer, D. Mavris** (2006), “Design of a Resource Advisor for the Next-Generation Surface Combatant” *Proceedings of the 38<sup>th</sup> Southeastern Symposium on System Theory*, Tennessee Technological University, Cookeville, TN, March 5-7, 2006

**Abstract:** The purpose of this project is to investigate the development of a resource advisor for the next-generation surface combatant of the US Navy. Reductions in crew size for these future vessels and increases in automation are likely to overburden the operators of these highly interdependent dynamical systems. The Integrated Engineering Plant (IEP) is a dynamical network of interdependent systems that provide services to the ship such as awareness, mobility, etc. The heterogeneous systems composing the IEP, i.e.: electric distribution, chill water, fire main, etc, trade resources between themselves and the optimum configuration of the system is a multi-disciplinarian problem exhibiting highly dynamic characteristics.

Hartley, L. and **Murphree, M.** (2006), “Influences on the Partial Liberalization of Internet Service Provision in Ethiopia,” presented at the *2006 Telecommunications Policy Research Conference*, George Mason University, Arlington, VA.

**Abstract:** Ethiopia’s Internet service provision industry is at a critical juncture between deepening competitive reforms and continuation of the status quo in its chosen path of partial liberalization. This paper will show how the introduction of peripheral competition will likely not change the nature or quality of Internet service provision in Ethiopia. The institutional framework of the Internet Service Provision sector can be modeled as a continuum of willingness to accept competitive reforms among the various actors. While there is consensus for reform, views of further liberalization and the rate of expanding competitive provision of services vary along this continuum. We find that in accordance with their institutional powers and perceptions, the stakeholders with the most influence generated ISP reform with barriers to effective partial liberalization.

**Komerath, N.M., Rangedera, T., and Nally, J.** (2006.) “Space-Based Economy Valuation, Analysis, and Refinement”, AIAA Paper 2006-7204, *Space 2006 Conference*, San Jose, CA.

**Abstract:** A sequence is postulated through which today’s mission-dominated space enterprise may begin the transition into a self-sustaining space-based economy dominated by extraterrestrial resources and services. A set of 15 enterprises is considered that define the basis for the expansion to another 15 larger enterprises. Examples of the first four enterprises are given. Interactions between these enterprises are projected to enable an order of magnitude reduction in the cost of access to geosynchronous orbit.

**Komerath, N.M., and Komerath, P.P.** (2006) “Are Distributed Energy Systems Optimal In India?” *Proceedings of the WAVES Conference*, Houston, TX

**Abstract:** This paper explores the hypothesis that solutions based on distributed intelligence, investment, and effort are more optimal for India than the textbook solutions that are based on the

assumed economies of scale of centralized plants. Following general explorations of the reasons for today's status, the paper summarizes prospects for different technological approaches. The particular case of wind energy is explored in detail, first showing why the traditional approach chooses massive turbines. An approach based on small turbines is then proposed. It is argued that such an approach opens doors to integrating the diverse technologies and resources into a comprehensive nation-wide solution. The net present value of national investment is used as a simple metric to compare approaches.

**Moore, D.** "Nanotechnology and the Developing World" in *Nanoethics*

**Abstract:** Many nanomaterial-based technologies will bring the ability to solve some of the more pressing problems of third-world and economically depressed peoples. For example, clear water supply promises to be an important issue in coming years, especially in underdeveloped countries. Effective and cheap water filtration systems that can work in harsh environments can be extremely useful in helping to solve this problem. Nanoparticles could help in filtration systems, creating better filters for cleaning out the bacteria and viruses that contaminate the water supplies. Further, on a larger scale, magnetic nanoparticles could act as *in situ* sensors for determining when water filtration is working. Another example is a cheap, reliable energy supply that is readily available and easily transported. Nanotechnology-based energy generation such as extremely efficient solar cells or wind power generation, will help to bring this about. However, these technologies will doubtless be developed in countries and among peoples that are prosperous. This paper will explore what ethical obligation and role the developed countries have in transferring nanotechnological developments to third world peoples and what value it can rightfully gain from this.

**Shannon, M.** (2006) Response to the "New Framework for the Utilization of Nuclear Energy in the 21<sup>st</sup> Century: Assurances of Supply and Non-Proliferation." 50<sup>th</sup> IAEA General Conference, Vienna, Austria

**Abstract:** The 50<sup>th</sup> IAEA General Conference Special Event: New Framework for the Utilization of Nuclear Energy in the 21<sup>st</sup> Century: Assurances of Supply and Non-Proliferation was a fruitful discussion of the issues and positions on this critical topic. However, despite the comprehensive discussion of these issues, there was a notable neglect of the security dimension and how to best strengthen the NPT regime to ensure safety and non-proliferation in the coming "nuclear renaissance." This oversight weakens many economic arguments made at the conference and is regrettable.

## Books or Chapters in Books

**Best, M.L.** and Pehrson, B. (2006) "Understanding Broadband Technologies" *Trends in Telecommunication Reform 2006*, Geneva: ITU

**Best, M.L.** ed. (2006) *Last Mile Initiative Innovations: Research Findings from the Georgia Institute of Technology*. Washington DC: USAID

**Best, M.L.,** and Pehrson, B. (2006) "The Broadband Era Arrives." in ITU ed. *Trends in Telecommunication Reform 2006*. Geneva: ITU

**Best, M.L.**, and Pehrson, B. (2006) “Understanding Broadband Technologies”, *Trends in Telecommunication Reform 2006*. Geneva: ITU

**Goodman, S.E.**, House, C. et al., (2006) “Risks and Exposures,” Chapter 6 in William Aspray, Frank Mayadas, and Moshe Vardi, eds., *Globalization and the Offshoring of Software*. New York: ACM

Straub, D., **Goodman, S.E.**, and Baskerville, R. (eds.) (2007) *Information Security Policies, Processes and Practices*, New York: M. E. Sharpe

Nain, D., Donaghy, N., and **Goodman, S.E.** (2007) “The International Landscape of Cyber Security,” Chapter 9 in [Straub et al. above]

Straub, D., **Goodman, S.E.**, and Baskerville, R. (2007) “Framing the Information Security Process in Modern Society,” Chapter 1 in [Straub, et al., above]

Straub, D., **Goodman, S.E.**, and Baskerville, R. (2007) “Promising Future Research in Information Security,” Chapter 11 in [Straub, et al., above]

**Stulberg, A., Salomon, M.D.** and Long, A.G. (2007) *Managing Defense Transformations: Agency, Culture, and Service*. London: Ashgate Academic Press.

## Articles and Published Papers

Weston, N.R, **Balestrini-Robinson, S.**, Fulmer, D.D., and **D.N. Mavris.** (2006) “Design of a Resource Advisor for the Next-Generation Surface Combatant,” in *Proceedings of the 38th IEEE Southeastern Symposium on System Theory*, Tennessee Technological University, Cookeville, TN

Hughes, R., **Balestrini-Robinson, S.**, Kelly, K.M., Weston, N.R. and **D.N. Mavris.** (2006) “Modeling of an Integrated Reconfigurable Intelligent System (IRIS) for Ship Design,” *ASNE Ships & Ship Systems Technology (S3T) Symposium, NSWC-CD*, West Bethesda, MD

**Best, M.L.**, and Wade, K. (In review) “The Internet and Democracy: Global catalyst or democratic dud?” *Globalizations*.

**Best, M.L.**, and Maier, S. (In review) “Gender and ICT Use in Rural South India.” *Gender Technology and Development*

Kumar, R., and **Best, M.L.** (In review) “Social Impact and Diffusion of Telecenter Use: A Study from the Sustainable Access in Rural India Project.” *Community Informatics*.

**Best, M.L.**, and Wade, K. (In review) “Democratic and Anti-Democratic Regulators of the Internet: A Framework.” *The Information Society*.

Kumar, R., and **Best, M.L.** (2006) “Impact and Sustainability of E-Government Services in Developing Countries: Lessons Learned from Tamil Nadu, India.” *The Information Society*, 22(1)

**Best, M.L.** (2006) “Kali, Creator and Destroyer: A Personal Recollection on Media Lab Asia.” *Information for Development*, 4(1)

**Best, M.L.** (2006) “Adaptive Value within Natural Language Discourse.” *Interaction Studies*, 7(1)

**Breznitz, D.** (In review) “Diffusion of Academic R&D Capabilities as an Industrial Innovation Policy? – The Development of Israel’s IT Industry.” *Journal of Technology Transfer*

**Breznitz, D.** (2006) “The Diffusion of Academic R&D Capabilities and Economic Development.” *ISA Annual Meeting: The North-South Divide and International Studies. Panel WA43: Political Constraints, Education, and Economic Growth*, San Diego, CA.

**Breznitz, D.** (2006) “A Misunderstood Miracle – The State and the Growth of the IT Industry in Ireland.” *DRUID-DIME Academy Winter 2006 PhD Conference – The Evolution of Capabilities and Industrial Dynamics*, Copenhagen, DN

Braun, B., **Charney, R.**, Clarens, A., Farrugia, J., Kitchens, C., Lisowski, C., Naistat, D., and O’Neal, A. (2006) “Completing our Education: Green Chemistry in the Curriculum.” *Journal of Chemical Education*, 83(8)

**Goodman, S.E.**, Kirk, J. and Kirk, M. (2007) “Cyberspace as a Medium for Terrorists,” *Technological Forecasting and Social Change*, 74(2)

**Goodman, S.E.**, (2006) review of *Engineering Communism: How Two Americans Spied for Stalin and Founded the Soviet Silicon Valley*, in *Technology and Culture*, Vol. 47

**Goodman, S.E.**, (2007) “Cyberterrorism and Security Measures,” Chapter 5 in *Science and Technology to Counter Terrorism: Proceedings of an Indo-U.S. Workshop*, (see also commentary in Chapters 6 and 18), Washington DC: NAP

**Gourley, B.** (2006) “Iran’s Nuclear Program: Separating Fact for Rhetoric,” *Examining the NPT – Issue Analysis*, Vol. 1, No.1

**Iachello, G.**, Truong, K.N., Abowd, G.D., Hayes, G.R., and Stevens, M. (2006) “Prototyping and Sampling Experience to Evaluate Ubiquitous Computing Privacy in the Real World.” *Proceedings of CHI 2006*, Montreal, Canada.

**Iachello, G.** and Abowd, G.D. (In Review) “The Development and Evaluation of the Proportionality Design Method for Privacy.” *Transactions on Computer-Human Interaction*.

**Iachello, G.** and Hong, J. (In Review) “The Privacy Landscape in Human-Computer Interaction.” *Foundations and Trends in Human-Computer Interaction*.

**Iachello, G.** and Abowd, G.D. (2007) “Are ‘Privacy Design Methods’ Useful? Conclusions from an Empirical Investigation.” *CHI 2007*.



Sylvan, R., **Komerath, N.**, Wollert, K., Tang, E.Z., Homnick, M., and Palaia, J. (2006). "The Emerging Inner Solar System Economy." *Proceedings of the ASCE Space and Earth 2006 Conference*, League City, TX.

**Long, B.** (In review) "Personal Identity Transformation and Societal Reconciliation." *Peace and Conflict Studies*.

**Shehan, E.**, Goyal, S., and Edwards, K. (2006) "Pinning the Tail on the Networked Donkey: Why IT@Home Needs Network Visualization." *CHI 2006 Workshop on IT@Home*, Montreal, Canada.

**Stubbs, D.** et.al. (2006) "The Do's and Don'ts: Creating a Path to Impact Science and Math Literacy." *Proceedings of the Oak Ridge Center for Advanced Studies (ORCAS) Workshop on K-12 Science and Math Education*. Oak Ridge, TN.

**Stulberg, A.** (2007) "Managing the Unmanned Revolution in the U.S. Air Force." *Orbis*, 51(2).

**Stulberg, A.** (2006) "Russia's Nuclear Industry: Centralization, Control, and Competition." *Osteuropa*, April, pp. 199-220.

**Stulberg, A.** (2007) Book review: "The Future of War: Organizations as Weapons." Mark D. Mandeles (Washington, DC: Potomac Books, Inc. 2005)." *Journal of Strategic Studies*.

## Conference Participation

**Goodman, S. E.** "International Internet Governance for Cyber and Telecommunications Security – NSTAC-RDX Workshop." Ottawa, Canada

**Goodman, S. E.** Invited participant as Georgia Tech NSF SFS PI, "Cyber Corps Conference 2006", Washington DC, January 9-11, 2006

**Goodman, S. E.** Organizer and moderator, with A. Ansari, J. Nemhauser, J. Cono, and S. Gorman of the Centers for Disease Control and Prevention, mini-symposium on "Public Health Responses to Weapons of Mass Destruction," Georgia Tech, Atlanta, GA, March 7, 2006

**Goodman, S. E.** Invited participant, "Senior Leader Seminar", Africa Center for Strategic Studies, NDU, Atlanta, GA, June 11-23, 2006 (The Sam Nunn School co-sponsored parts of this conference.)

**Goodman, S. E.** Invited participant, "Facing the Threat of a Pandemic Influenza," symposium sponsored by the Safe America Foundation and NBC Universal, New York, NY, Sept. 6, 2006

**Goodman, S. E.** Invited participant, "Global Approaches to Global Threats and Opportunities: Defining a New Maritime Strategy for the Nation," Maritime Strategy Symposium Series, Naval War College, Atlanta, GA, February 9, 2007

**Hertel, N. and Shannon, M.** “New Framework for the Utilization of Nuclear Energy in the 21<sup>st</sup> Century: Assurances of Supply and Non-Proliferation.” IAEA, Vienna, Austria, Sept. 19-21, 2006

**Iachello, G.** “ACM Conference on Human Computer Interaction 2006.” Montreal, Canada, April 22-27, 2006

**Komerath, N.** “Space Technology and Applications International Forum.” American Institute of Physics, Albuquerque, NM, Feb. 2006

**Komerath, N.** “Applied Aerodynamics, Fluid and Plasmadynamics and Lasers Conference.” American Institute of Aeronautics and Astronautics (AIAA), San Francisco, CA, June 2006

**Komerath, N.** “American Society for Engineering Education, Annual meeting.” Chicago, June 2006

**Melonakos, J.** “SPIE MI 2006 – The International Society for Optical Engineering International Symposium on Medical Imaging” San Diego, CA, Feb. 11-16, 2006

**Shannon, M.** “Symposium on International Safeguards: Addressing Verification Challenges” Vienna, Austria, October 16-20, 2006

**Shehan, E.** “Human Factors in Computing (CHI – 2006).” Montreal, Canada, April 24-27, 2006

**Shehan, E.** “ACM Symposium on Usable Privacy and Security (SOUPS – 2006).” Pittsburgh, PA, July 12-14, 2006

**Shehan, E.** “8<sup>th</sup> International Conference on Ubiquitous Computing (UbiComp 2006).” Orange County, CA, Sept. 17-21, 2006

**Shehan, E.** “Grace Hopper Celebration of Women in Computing – 2006” San Diego, CA, Oct. 4-7, 2006

**Sorrell, C.** “Women in Chemistry Workshop.” Atlanta, GA, Oct. 2006

**Stubbs, D.** “ORCAS workshop on K-12 Science and Math Education, Convened by the Oak Ridge Center for Advanced Studies (ORCAS).” Oak Ridge, TN, April 18-19, 2006

## **Presentations and Talks**

Abowd, G.D. and **Iachello, G.** “Design by Proportionality Applying DPA and Court Techniques To UbiComp Design – Design Method Evaluation.” 2005 UbiComp Privacy in Context Workshop, Tokyo, Japan, Sept. 11, 2005.

**Best, M.L.** “ICT's and International Development: Village Information Centers and their National Context.” Paper presented at Kigali Institute of Science and Technology, Kigali, Rwanda, June 23, 2005.

**Best, M.L.** “ICT's and Economic Growth with Equity: A research agenda.” Paper presented at Sam Nunn Bank of America Policy Forum, Georgia Tech, Atlanta GA, March 27, 2006.

**Best, M.L.** “Technology Trends” Paper presented at ITU Virtual Conference on New Technologies, March 13, 2006

**Best, M.L.** “Memetics: An Analysis of Internet Conversations.” Paper presented at DARPA Memetics Workshop, Arlington, VA, April 4, 2006

**Best, M.L.** “(Weak) Digital Institutions: Soybeans and Death Certificates in Rural India.” Paper presented at Berkmen Center for Internet and Society, Harvard University, Cambridge MA, May 3, 2006

**Best, M.L.** “Computing in Developing Countries.” Paper presented at College of Computing Advisory Board Meeting, Georgia Tech, Atlanta GA, May 16, 2006

**Best, M.L.,** and E.J. Wilson, III. “Open Access Publishing and ICTD.” Paper presented at International Conference on Information and Communication Technologies and Development, University of California, Berkeley, CA. May 25, 2006

**Best, M.L.** “Rwanda: Towards a Knowledge-Based Economy.” Paper presented at Kigali Institute of Science and Technology, Kigali, Rwanda, May 31, 2006

**Best, M.L.** “GATech Liberia ICT4D Project.” Paper presented at e-Liberia Vision Working Meeting, Georgia Tech, Atlanta GA, Sept. 13, 2006

**Best, M.L.** “HCI4D.” Paper presented at College of Computing HCI MS Symposium, Georgia Tech, Atlanta GA, Sept. 21, 2006

**Best, M.L.** “A Global Survey of Spectrum License Exemptions” Paper presented at the The 34th Research Conference on Communication, Information and Internet Policy (TPRC). Oct. 2006

**Best, M.L.** “Design for Development: Rethinking Computers and the Internet for Africa and South Asia.” Paper presented at GVU Brown Bag, Georgia Tech, Atlanta GA, Oct. 18, 2006

**Best, M.L.** “Harnessing ICT's: Cutting-Edge Perspectives.” Paper presented at Frontiers of Knowledge in Science and Technology for Africa, University of Cape Town, South Africa, Nov.18, 2006

**Endicott, J.** Speech at a National Intelligence Service (South Korean intelligence agency) “Conference on North Korean Strategic Culture”, Seoul, Korea, Feb. 22, 2007

**Endicott, J.** Speech at a CIA-sponsored “Conference on South Korean Strategic Culture”, Washington, D.C., Feb. 15, 2007

**Endicott, J.** Speaker with North Korea Korean delegation on the Georgia Tech campus, Sam Nunn School of International Affairs, Atlanta, GA, Dec. 4-6, 2006

**Endicott, J.** “Nuclear Free Zones: New Life – New Mission.” Seminar at J Nehru University, New Delhi, India, Oct. 24, 2006

**Endicott, J.** Speaker at a meeting of the Asia Society, “Impact of Generational Change on Korean-U.S. Security”, Washington, DC, Oct. 5, 2006

**Endicott, J.** Interview on WGST Radio and with Atlanta Times Korean Newspaper on “Limited Nuclear Weapons Free Zone for NEA”, Atlanta, GA, Oct. 11, 2006

**Endicott, J.** Lecture on “Limited Nuclear Weapons Free Zones and Arms Control Treaties” Program with Air University Counterproliferation Center. Atlanta, GA, June 7-8, 2006

**Endicott, J.** Address to the Atlanta consular corps on “Track II efforts for a Limited Nuclear Weapons Free Zone for NEA”, Atlanta, GA, May 24, 2006

**Endicott, J.** Lecture on the “Battle of Nomonhan.” Part of the Oglethorpe University lecture series. Atlanta, GA, May 17, 2006

**Endicott, J.** Keynote Address to Marine Mess Night on “NEA Security” Atlanta, GA, Received the General Ray Davis Award, April 20, 2006

**Endicott, J.** Briefing to the Deputy Minister for Foreign Affairs Tsuneo Nishida at a roundtable on security in Northeast Asia, spoke on the outcomes of Limited Nuclear Weapons Free Zone meeting, Tokyo, March 23, 2006

**Endicott, J.** Hosted and chaired the “10th Full Plenary Meeting of the Limited Nuclear Weapons Free Zone for Northeast Asia” and made special presentation on the future of the NPT, Shanghai, PRC, March 19-22, 2006

**Endicott, J.** Speaker at Dr. Nolan Hertel’s class on the “Limited Nuclear Weapons Free Zone and reform of the NPT” Georgia Tech. March 9, 2006

**Endicott, J.** Speech at Track II meeting in New York – dialog with DPRK and US officials, New York, March 6, 2006

**Endicott, J.** Moderator at the International Decisions Forum at Emory University on “US-North Korean Relations—A Time for New Thinking”, Emory University—Atlanta, January 19, 2006.

**Endicott, J.** Luncheon Moderator at Atlanta Council for International Relations with the Consuls General from Australia, Japan, and Korea. Atlanta, GA, January 19, 2006.

**Goodman, S.** “Building National Capabilities in Cybersecurity.” National University of Rwanda, Butare, Rwanda, May 30, 2006

**Goodman, S.** “Building National Capabilities in Cybersecurity.” Kigali Institute of Science and Technology, Kigali, Rwanda, May 31, 2006

**Goodman, S.** “Joint effort with CMU to help build national cybersecurity capabilities in LDCs” Presentation to Meeting on Science, Technology, and Security, MacArthur Foundation, Chicago, IL, May 17, 2006

**Goodman, S.** “Lecture at NIO (S&T)” McLean, VA., April 26, 2006 - Attended by former fellows and employees at NIO, **Stephanie Dirring** and **Jose Gonzales**

**Goodman, S.** Hurley, D., and Morel, B. “Cyber Security in Africa,” Panel organizer, chair, and speaker at Senior Leader Seminar, Africa Center for Strategic Studies held in Atlanta, GA, National Defense University, Washington, DC, June 19, 2006

**Goodman, S.,** “Risks and Exposures” presentation on ACM Offshoring Study and Beyond panel “CRA Conference” at “Snowbird 2006”, Snowbird, UT, June 26, 2006.

**Goodman, S.** “Challenges in Critical Infrastructure Protection,” Panel moderator at Joint Sam Nunn School and Women in International Security (WIIS) forum, Georgia Tech, Atlanta, Sept. 19, 2006.

**Goodman, S., Long, W., and Endicott, J.** “A Balancing Act: University and National Security.” Panel member at Conference co-sponsored by the FBI and Georgia Tech, Atlanta, GA, Nov. 30, 2006.

**Goodman, S.** Co-organizer and wrap-up panel chair, “Workshop on ICTs and National Reconciliation,” Sam Nunn School, Georgia Tech, Atlanta, GA, March 28, 2006

**Goodman, S.** “Protecting Cyberspace,” Nuclear and Radiological Engineering Seminar, Georgia Tech, April 6, 2006

**Goodman, S.** Panel chair, “Perspectives on Promoting Global Cybersecurity,” WSIS Action Line Facilitation Meeting: Building Confidence and Security in the Use of ICTs (C5), ITU, Geneva, Switzerland, May 15-16, 2006

**Goodman, S.** and **M. Best**, Invited participant, NICI II Implementation Retreat, Government of Rwanda, Gisenyi, Rwanda, June 1, 2006

**Goodman, S.** Invited speaker and participant, “Workshop on The Future of Science and Technology: Implications for Security,” The Intelligence Science Board, St. Michaels, MD, June 4-6, 2006.

**Goodman, S.** Co-facilitator (with R. Wallace), sub-workshop on “International Internet Governance,” part of the 2006 RDX Workshop on “International Collaboration on Cyber Security Research and Development,” the President’s National Security Telecommunication Advisory Committee (NSTAC), Ottawa, Ontario Canada, September 20-22, 2006. (also a member of the workshop organizing committee)

**Goodman, S.** Host and speaker, “Consortium Meeting of the Institute for Information Infrastructure Protection (I3P),” Atlanta, GA, Nov. 30 – Dec. 1, 2006

**Goodman, S.** Participant and panel speaker, “NSF Cyber Trust 2007 Conference,” Atlanta, GA, January 28-30, 2007

**Goodman, S.** “New and Expanded Risks and Exposures Resulting from the Globalization of the Information Infrastructure,” The Global Information Infrastructure - Intelligence, National and International Security, The National Intelligence Council and the Department of State, Washington, DC, February 5, 2007.

**Goodman, S.** Speaker and panelist (with Gregory Rattray and Jody Westby), “Possibilities and Limitations for International Agreements in Controlling Cyber Conflict,” Workshop on Cyber Conflict, International Cooperation, and Deterrence, CCSA and the Naval Postgraduate School, Monterey, CA, March 6-7, 2007.

**Goodman, S.** “Critical Information Infrastructure Protection: Silver Bullets or Tough Grind?” invited keynote at the First Annual IFIP WG11.10 International Conference on Critical Infrastructure Protection, IFIP, Hanover, NH, March 18-21, 2007

**Gourley, B.** “Is There a Future for the NPT?” Seminar in Nuclear Engineering, Georgia Tech, Jan. 26, 2006

**Gourley, B.** “Sam Nunn Security Program Overview” Presentation to a delegation of Uri Party politicians from the Republic of Korea, July 20, 2006

**Gourley, B.** “Iran’s Nuclear Weapons Program” Presentation to the *Radiation Sources and Applications* Seminar at Georgia Tech, Sept., 11, 2006

**Gourley, B.** “Sam Nunn Security Program Overview” Presentation to Dr. Carl Rhodes, Manager of the Technology and Applied Sciences Group at RAND, September 20, 2006

**Hertel, N.** “Highly Enriched Uranium (HEU) and Research Reactors” Presentation to the Atomic Energy Institute, Swierk, Poland, May 9, 2006

**Hertel, N.** “Highly Enriched Uranium (HEU) and Research Reactors” Presentation to the Institute of Nuclear Physics, Polish Academy of Science in Krakow, Poland, May 10, 2006

**Iachello, G.,** and Abowd, G.D. “Three ‘Contexts’ to Keep in Mind When Investigating Privacy” CHI 2006 Privacy Workshop, Montreal, Canada, April 22, 2006

**Komerath, N.** “Invited Presentation on Space Policy and Economics.” Georgia Tech Mars Society Meeting, Atlanta, GA, Jan. 2006

**Komerath, N.** “Energy Market in Agriculture, and relevance to Space Resources” 8th Continent Chamber of Commerce project for space resource utilization. Founding Workshop, Golden, CO, May 2006

**Komerath, N.** “8<sup>th</sup> Continent Chamber of Commerce” Colorado School of Mines; May 1, 2006 (Dr. Komerath is one of the founders of the 8CCC, which explores the market for space resources. He spoke on the role of renewable energy as a route to space resource extraction.)

**Komerath, N.** “Opportunities in micro-renewable energy in the developing world.” Paper presented at WAVES Conference, Houston, TX, July 2006

**Komerath, N.M.** “Renewable Energy Market Opportunities: Relevance to Space Resources.” Presented to 8th Continent Chamber of Commerce Second Workshop, Aug. 2006

**Komerath, N.M.** Nally, J., Tang, E. Z. “Policy Model for Space Economy Infrastructure.” Presented to the Mars Society, Georgia Institute of Technology, Atlanta, GA, Jan. 2006

**Komerath, N.M.** “Learning by Iteration” 2006 Hessburgh Senior Faculty Fellows poster presentation, Georgia Tech, Atlanta, GA, April 2006

**Komerath, N.M.** "Agriculture and Space Solar Power." Presentation to the 8th Continent Chamber of Commerce Workshop 1, Colorado School of Mines, Golden, CO, May 2006

**Komerath, N.M.** and Fort, B. "Renewable Energy" Presentation to the 8th Continent Chamber of Commerce Workshop 2, Colorado School of Mines, Golden, CO. Aug. 2006

**Murphree, M.** and Hartley, L. “Influences on the Partial Liberalization of Internet Service Provision in Ethiopia” Paper presented at *Telecommunications Policy Research Conference*, George Mason University, Arlington, VA, Sept. 29-Oct. 1, 2006

**Shehan, E.** “Pinning the Tail on the Networked Donkey: Why IT@Home Needs Network Visualization.” Presentation at CHI 2006 IT @ Home workshop, Montreal, Canada, April 23, 2006

**Shehan, E.** “Making the Invisible Visible: Creating Interactive Visualizations of Home Networks.” Poster and presentation at Grace Hopper Celebration of Women in Computing, San Diego, CA, Oct. 4-7, 2006

**Stulberg, A.** “The Credible Commitment Problem and Prospects for Extending Cooperative Nuclear Safety and Security Assistance in South Asia: Lessons from U.S.-Russian Cooperative Threat Reduction,” Paper presented at Ministry of External Affairs-School of International Studies, J. Nehru University Conference, “Multilateralism, Disarmament, and Arms Control”, New Delhi, India, Oct. 25-26, 2006

**Stulberg, A.** “Managing the Unmanned Revolution in the USAF: Toward a Future of Normalization,” Presentation to U.S. Air Force Research Lab/Human Effectiveness Directorate, Futurist Conference: Predicting Warfare in 2025, Dayton, OH, May 31, 2006

## **Professional Memberships and Activities**

**Best, M.L** (Steering Committee), *Digital Opportunities Task Force Non-profit Organizations (DOT Force NPO)*

**Best, M.L.** (Co-Founder and EDITOR-IN-CHIEF), *Information Technologies and International Development*, Published by the MIT Press

**Best, M.L.** (Executive Committee), *Microsoft Community Technology Learning Center Advisory Council*

**Best, M.L.** (Faculty Council), *MIT Program on Human Rights and Justice*

**Best, M.L.** (ICT Consultant), *The World Bank, United Nations, USAID, and ITU.*  
Consultant on national ICT policies, rural connectivity, energy systems, and other issues

**Best, M.L.** (Member – Editorial Board) *Innovations*, MIT Press

**Breznitz, D.** (Organizer), *Globalization and Development* – seminars and workshops series – The Sam Nunn School, Georgia Institute of Technology

**Endicott, J.E.** (Fellow), *International Institute for Strategic Studies*

**Endicott, J.E.** (Member of the Board of Directors), *National Defense University Foundation*

**Goodman, S.E.** (Member), *Community Based Cyber Security Policy Group*, Department of Homeland Security

**Goodman, S.E.** (Member), *Cyber Conflict Studies Association*

**Goodman, S.E.** (Member), *Economic Security Working Group, NTIA*, US Department of Commerce

**Goodman, S.E.** (Member), *Global Expertise Reserve*, National Intelligence Council, Washington, DC

**Goodman, S.E.** (Member and Chair), *Committee on Improving Cybersecurity Research in the United States*, Computer Science and Telecommunications Board, National Research Council

**Goodman, S.E.** (Member), *R&D Exchange Task Force (RDXTF)*, R&D Conference Planning Committee, President's National Security Telecommunications Advisory Committee (NSTAC)

**Goodman, S.E.** (Member and Chair) *Risks and Exposures Subcommittee*, Committee to Study the Economic and Security Impact of Offshoring in the IT Sector (final title to be determined), ACM

**Goodman, S.E.** (Member), *Telecommunications Study and Advisory Panel*, Department of Defense and Applied Physics Laboratory, Johns Hopkins University

**Goodman, S.E.** (Member), *USACM*, The Association for Computing Machinery's US Public Policy Committee

**Goodman, S. E.** (Member) Committee on Computing and Public Policy, Association for Computing Machinery (ACM)



**Goodman, S. E.** (Adjunct Fellow) Center for Strategic and International Studies

**Goodman, S. E.** (Contributing Editor) International Perspectives, *Communications of the ACM*

**Goodman, S. E.** (Associate Editor) *Communications of the AIS*.

**Goodman, S. E.** (Editorial Advisory Board) *The Electronic Journal on Information Systems in Developing Countries*

**Goodman, S. E.** (Editorial Advisory Board) *Information Technology for Development*

**Goodman, S. E.** (Editorial Advisory Board) *J. Information Technology and International Development*

**Goodman, S. E.** (Editorial Advisory Board) *International Journal of Cyber Crimes and Criminal Justice*

**Goodman, S. E.** (GTISC representative) National Consortium under the Institute for Information Infrastructure Protection (I3P), Dartmouth College, Hanover, NH

**Goodman, S. E.** (Member) International Institute for Strategic Studies, London, UK

**Hertel, N.** (Member – Editorial Advisory Board), *Nuclear Technology*

**Hertel, N.** (Member – Editorial Advisory Board), *Progress in Nuclear Energy*

**Hertel, N.** (Member – Editorial Board), *Radiation Protection Dosimetry*

**Hoehn, W.** (Member – Editorial Advisory Board), *Frontline First Responder*

**Iachello, G.** (Member) *Association of Computing Machinery*

**Iachello, G.** (Member) *Institute of Electrical and Electronics Engineers*

**Komerath, N.** (Secretary/Treasurer) *American Society for Engineering Education Aerospace National Executive*

**Komerath, N.** (Participant) *Space Resources Utilization Roundtable*

**Komerath, N.** (Associate Fellow) *American Institute of Aeronautics and Astronautics*

**Komerath, N.** (Fellow) *NASA Institute of Advanced Concepts*

**Moore, D.** (Member), *Nanoethics Group Advisory Board*, available at [www.nanoethics.org](http://www.nanoethics.org)

**Rutkowski, A.** (International Editorial Board), *Telecommunications Policy Magazine*

**Rutkowski, A.** (advisory board), *Info Magazine*

**Rutkowski, A.** (President), *Global Lawful Interception (LI) Industry Forum*

**Shehan, E.** (Member) *Association of Computing Machinery*

**Shehan, E.** (Member) *US ACM – ACM US Public Policy Committee*

**Yim, M.S.** (Member - Editorial Advisory Board), *Progress in Nuclear Energy*

**Yim, M.S.** (Member), Nuclear Nonproliferation External Steering Committee, Idaho National Laboratory

## ***Appendix C: Out-of-Institute Site Visit Agendas***

### **Washington DC in May 2006**

#### Site Visits / Briefings Received at:

- House Homeland Security Committee
- Office of Senator Jeff Bingaman
- Department of Energy's National Nuclear Security Agency
- Department of State's Bureau of Verification, Compliance, and Implementation
- Central Intelligence Agency Headquarters
- Aberdeen Test Center
- Edgewood Chemical Biological Center
- Army Research Laboratory - Aberdeen

### **Savannah / Savannah River Site Trip in October 2006**

#### Briefings at:

- Maritime Logistics Innovation Center
- Port of Savannah
- Savannah River Site & Savannah River National Laboratory

### **Plant McDonough (Southern Company) Facility in February of 2007**

## Appendix D: Sam Nunn Forum Posters

<b>Author(s)</b>	<b>Title</b>
Patrick Biltgen, Tom Caulfield, and Drew Reid	<i>Development of a Future Energy Policy Using Probabilistic Multiple Attribute Decision Making</i>
Kelly Caine and Walter Hargrove	<i>Rwandan Coffee Stakeholders: Need for and Familiarity with ICT Solutions</i>
Tony Dickherber and William Hunt	<i>Breaking down cost barriers to improve public health: Applying emerging technologies and low cost microelectronic production techniques to improve global access to public health screening</i>
Sofia Espinoza	<i>Evaluating the Potential Impact and Affordability of ICTs in Rural Primary Health Centers of Peru</i>
Walter Hargrove and Clint Cope	<i>Tablink: Patient Centered Communication</i>
Lynn Hartley and Michael Murphree	<i>Influences on the Partial Liberalization of Internet Service Provision in Ethiopia</i>
Kipp Jones	<i>Whither or Wither: Sustainability of Regional Regulatory Bodies</i>
Taehyun Jung and Keegan Wade	<i>Rural Internet Dissemination: Lessons from the Macedonia Connects Aid Model</i>
Divya Kalb	<i>Empowerment and Equality Through E-Commerce</i>
Daniel Moore	<i>Nanotechnology and the Developing World: Transferring Nanotechnology Developments To Third World Peoples</i>
Benay Sager, Seymour Goodman, and Ayse Alibeyoglu	<i>The Internet and Cyprus: An Assessment of the Diffusion and the Role of the Internet in Cyprus</i>
David Sibal	<i>USAID Implementing Networks: A Macedonian e-Case Study</i>
Judith Siegel	<i>Integrating Local and Regional Contexts when Designing User Interfaces for Healthcare Applications</i>
Keegan Wade and Michael Best	<i>The Internet and Democracy</i>

# Financial Account

## Programmatic Expenses

Program operating expenses for all years are tabulated below:

Expense	Approved Budget	Expenditures	Variance
Salaries and Wages	\$322,046.60	\$475,939.45	-\$153,892.85
Fringe Benefits	\$127,912.89	\$89,970.33	\$37,942.56
Fellowship Stipends	\$417,226.81	\$240,000.00	\$177,226.52
<b>Total Personnel Costs</b>	<b>\$867,186.30</b>	<b>\$805,909.78</b>	<b>\$61,276.52</b>
Tuition Remission	\$28,338.50	\$33,323.16	-\$4,984.66
Travel	\$60,000.00	\$93,085.11	-\$33,085.11
Materials & Supplies	\$133,388.92	\$188,550.16	-\$55,161.24
<b>Total Direct Costs (Excl. Equipment)</b>	<b>\$1,088,913.72</b>	<b>\$1,120,868.21</b>	<b>-\$31,954.49</b>
Indirect Costs (15% of Direct Costs)	\$159,086.28	\$127,131.79	\$31,954.49
<b>Total Expenses</b>	<b>\$1,248,000.00</b>	<b>\$1,248,000.00</b>	<b>0</b>
Equipment (non-MacArthur Funds)	\$40,000	\$40,000	0

**Sam Nunn Security Program Financial Statement**

Organization: Sam Nunn Security Program

Award#: 02-73321-000-GSS

Date of Report: May 31, 2007

Period Covered in Report: January 1, 2006 – March 31, 2007

Revenue from MacArthur Foundation Grant Funds to be Reported:

	U.S. Dollars
Grant funding Remaining as of 1/1/2006:	\$306,733.64
Cost Share Remaining as of 1/1/2006:	\$12,534.85
Interest Earned This Year:	\$0
Total Income:	\$319,268.49
Total Expenditures:	\$319,268.49
Balance:	\$0

Signed:

\_\_\_\_\_  
William Long  
Department Chair – Sam Nunn School of International Affairs

\_\_\_\_\_  
Date