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NC State University
2008 Public Policy Task Force
Final Report

Executive Summary

The North Carolina State University (NCSU) Task Force on Public Policy recommends that NCSU establish the *Institute for Science and Technology–Engaged Public Policy (InSTEPP)*. InSTEPP will provide intellectual leadership that serves the state, nation and world by applying the university’s expertise in science, technology and engineering to public policy. InSTEPP builds on three of NCSU’s existing public policy strengths, which establish the primary focus areas of the institute:

- (1) Energy and the environment;
- (2) Information security and bio-security; and
- (3) STEM (Science, Technology, Engineering and Mathematics) and workforce education.

InSTEPP will contribute to: 1) enhancing public policy within the state and nation to help leaders develop public policies that are well-informed by solid scholarship and practical knowledge in three areas of critical need, thus providing important benefits to society at large; and 2) a better understanding of the legal, sociological and economic implications of security, energy and the environment and STEM education, thus informing decision and policy makers.

The NCSU Task Force on Public Policy was convened in January of 2008 to prepare a plan for a comprehensive public policy initiative at NCSU. Our objective was to align our efforts with the university’s strategic plan and the *UNC Tomorrow Report*. We approached this objective by identifying NCSU’s current strengths, areas of expertise and opportunities for growth and expansion in public policy research, education and outreach.

The task force members unanimously agree that NCSU should commit to creating an atmosphere and environment that will enable faculty members’ interdisciplinary policy research programs to flourish and to engage with “real world” concerns. Particular attention must be paid to junior faculty members’ ability to thrive in this environment. Other universities with interdisciplinary centers offer joint appointments to junior faculty but these provide inadequate support for success as a result of conflicting and entrenched promotion criteria that often stifle true interdisciplinary work applied to real-world problems. The Task Force strongly recommends that InSTEPP be established at NCSU as an *interdisciplinary* institute that serves as the home department for its new faculty hires. This strategic approach will help ensure that the institute and its interdisciplinary faculty are professionally successful and socially relevant. This represents a bold, new paradigm for interdisciplinary research institutes in North Carolina.

InSTEPP and the activities described in this report represent a strategic and proactive response to North Carolina’s pressing needs for policy expertise in the face of extraordinary challenges ahead. These needs were specified in the *UNC Tomorrow Report*. A recent survey of nearly 7,000 North Carolinians¹ ranked “state-level assistance with public policy development and problem-solving” ninth among the areas where the “University of North Carolina [System] should focus its efforts and resources to have the greatest impact” on their community and #11

¹ J. DeBellis, L. Esterling and C. McLaurin. *UNC Tomorrow Survey Results*, downloaded from: http://www.nctomorrow.org/content.php/reports_documents/regional_forums/UNCT_Survey_Results_-_FINAL.pdf November 27, 2007.

among services they want the UNC System to maintain or increase². Furthermore, the UNC Tomorrow Report clearly affirms that the state needs public policy help from the UNC System as it goes through substantial changes of the immediate future. NCSU is globally recognized for its science, technology, engineering and mathematics leadership. At the same time, it is recognized in every community across North Carolina for its commitment to the service of the people of the state. NCSU, therefore, is uniquely positioned to contribute to the state and nation in the public policy arena, and the Institute described below will serve as a keystone for that commitment in the years ahead.

In his September 2007 State of NCSU speech, Chancellor James Oblinger committed the university to taking a leadership role in meeting some of the most important challenges facing society by introducing new initiatives and goals in five key areas. InSTEPP's primary focus areas are directly aligned with these five leadership areas: "Creating educational innovation" will be directly supported by InSTEPP activities centered on *STEM and workforce education*; "Improving health and well being" will be directly supported by InSTEPP activities in *information security and bio-security*; and, "Driving innovation and energy in the environment" will be directly supported by InSTEPP activities in *energy and the environment*. Furthermore, all proposed activities of InSTEPP will support the other two leadership areas of NCSU: "Preparing leaders for the state, nation, and world" and "Fueling economic development".

By focusing on energy and the environment, information security and bio-security, and STEM workforce education, InSTEPP represents a carefully designed mechanism for mobilizing NCSU's particular strengths to address pressing public policy challenges that are replete with ethical, legal, economic and societal concerns. The impact of this institute's scholarly and outreach work is expected to be far reaching and affect many spheres of society.

The NCSU Task Force on Public Policy identified additional strengths that we can leverage to further support the mission articulated in the UNC Tomorrow Report. The NCSU School of Public and International Affairs (SPIA), in the College of Humanities and Social Science, plays a central role in public policy instruction at undergraduate and graduate levels. Its faculty members are nationally and internationally known for their expertise in public management and public policy. In addition to the three primary focus areas mentioned above (energy and the environment; information security and bio-security; and STEM workforce education), the Task Force identified faculty members with considerable policy expertise in public health and health care systems; social, economic, and behavioral aspects of aging; social welfare issues; and education policies for youth and families at risk. Clearly, the potential for engaged public policy research is strong.

The proposed InSTEPP would create an intellectual center for public policy research, information dissemination, education, and outreach. Not only will the Institute facilitate and nurture relationships among NCSU faculty who share common research and application goals, it will also serve as a touchstone for state, regional, and national visibility of the university's strength in public policy.

The task force proposes an aggressive five-year time-table for the InSTEPP with the complete management team in place by Fall 2010. The cost projection for InSTEPP is \$3 million per year. Additional funding to support research and outreach activities as well as students and post-docs will be sought from external grants and contracts.

² *University of North Carolina Tomorrow Commission Final Report*, December 2007.

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1. Introduction

North Carolina faces an extraordinary future—three million new residents within 20 years, working in a knowledge and service based economy, and living in a transformed urban and suburban environment. At the same time, many parts of the state with which NCSU (North Carolina State University) has deep historic ties, risk being marginalized by this dramatic transformation.

University of North Carolina (UNC) System President Erskine Bowles recognized that the UNC System has a unique and indispensable role in helping our state prepare for these changes. He established the UNC Tomorrow Commission, which undertook a strategic review of the needs of the people of North Carolina and of the ability of the UNC System to respond to those needs. Among the recommendations of the Commission was a clear call for a significant expansion of the UNC System’s capacity to inform public policy.

NCSU responded to this new imperative by convening a Task Force on Public Policy³ in January 2008 to prepare a plan for a comprehensive public policy initiative at NCSU. The Task Force’s objective was to identify how the university, consistent with its strategic plan and with the recommendations of the *UNC Tomorrow Report*⁴, can play a constructive role in public policy making in the state and nation. We approached this objective by identifying the current strengths, areas of expertise and opportunities for growth and expansion in public policy research, education and outreach.

Promoting knowledge-based public policy is a key investment priority expressed in the NCSU Strategic Plan⁵. To this end, NCSU seeks to engage more fully in public policy within the state and nation to help leaders “develop public policies that are well-informed by solid scholarship and practical knowledge”⁵. Given that NCSU is North Carolina’s flagship university for science, engineering and technology, it is uniquely positioned to leverage these strengths when addressing the pressing public policy challenges in the state and nation.

In response to North Carolina’s immediate needs and responding to the mission of both the UNC System and NCSU, this report proposes the establishment of the *Institute for Science and Technology – Engaged Public Policy (InSTEPP)* at North Carolina State University.

Our report is organized as follows. Section 2 provides an overview of the NCSU Task Force on Public Policy. Section 3 provides an overview of the proposed institute with its goals. Section 4 addresses assessment and evaluation. Section 5 provides the management plan and implementation procedures. Appendix A contains the invitation letter and charge to the task force members. Appendix B contains the InSTEPP summary that was included in NCSU’s Response to the *UNC Tomorrow Report*. Appendix C contains the comprehensive inventory of Public Policy work at NCSU. Appendix D contains a report that provides an inventory of Public Policy work at NCSU’s benchmark institutions. Appendix E contains a list of NCSU public policy courses. Appendix F provides a list of key public policy personnel at NCSU.

³ The 2008 NCSU Public Policy Task Force was convened at the request of NCSU’s Vice Chancellor of Extension, Engagement and Economic Development, Dr. James Zuiches and Dean of the Graduate School, Terri Lomax.

⁴ *University of North Carolina Tomorrow Commission Final Report*, December 2007.

⁵ *North Carolina State University Strategic Plan*, June 8, 2006.

2. NCSU Task Force on Public Policy

The charge to the NCSU Task Force on Public Policy was to: (a) complete an inventory of public policy-related activities at NCSU, including course offerings, faculty research, funded research, research centers and institutes; (b) define a leadership role for NCSU; and (c) prepare an implementation plan for a comprehensive initiative in public policy at NCSU.

To complete the first part of its charge, the NCSU 2008 Task Force on Public Policy identified the current strengths, areas of expertise, and opportunities for growth and expansion in public policy research, education, and outreach at NCSU. The resulting inventory is comprehensive⁶, including 94 faculty members and professionals in 10 departments and non-departmental units and 13 centers or institutes who are engaged in public policy work (see Appendix B).

Our public policy inventory efforts were conducted systematically to develop the best possible understanding of the university's public policy work. Section 3 details the policy strengths we identified at NCSU as a result of this effort. Based on our analysis of these strengths and the challenges facing our state and nation, as expressed in the *UNC Tomorrow Report*, the task force defined a clear leadership role for NCSU within the UNC System that leverages those strengths. Finally, we propose an implementation plan for the institute.

3. Institute for Science and Technology – Engaged Public Policy

The NCSU Task Force on Public Policy recommends that NCSU establish the *Institute for Science and Technology—Engaged Public Policy (InSTEPP)* to provide knowledge-based research and intellectual leadership that serves the state, nation and world by applying science, technology and engineering to public policy. InSTEPP will build on three of NCSU's major public policy strengths:

- (1) Energy and the environment;
- (2) Information and bio-security; and
- (3) STEM (Science, Technology, Engineering and Mathematics) and workforce education.

3.1 Mission

The mission of the NCSU InSTEPP is to *provide knowledge-based research and intellectual leadership that serves the state, nation and world by applying science, technology and engineering to public policy.*

3.2 Goals and Objectives

InSTEPP will contribute to: 1) enhancing public policy within the state and nation to help leaders develop public policies that are well-informed by solid scholarship and practical knowledge in three areas of critical need, thus providing important benefits to society at large; and 2) a better understanding of the legal, sociological and economic implications of security, energy and the environment and STEM education, thus informing decision and policy makers. InSTEPP's goals for the next three to five years will facilitate and enable NCSU faculty and

⁶ Data was collected by college representatives on this task force from January – May of 2008.

students to accomplish the work needed for public and private efforts to successfully address the challenges identified in NCSU's strategic plan (preparing future leaders, creating educational innovation, improving health and well being, fueling economic development, and driving innovation in energy and the environment) through the Institute's instructional, research, and outreach and engagement programs. InSTEPP's specific goals and objectives are as follows:

Goal #1: InSTEPP will educate students in core priority inter-disciplinary policy topics.

Objective 1.1: to create two new domain-specific degree programs (e.g., degrees in environmental policy, and security/engineering public policy and law).

Goal #2: InSTEPP will proactively identify and analyze emerging public policy needs.

Objective #2.1: to generate external funding for the multi- and interdisciplinary public policy research efforts necessary in the core priority topics.

Goal #3: InSTEPP will work with researchers to translate scientific information and research for both public and governmental policy- and decision-makers. InSTEPP will become the clearinghouse to which state legislators, media, industry, and the public turn to for information on energy and the environment, information security and bio-security, and STEM and workforce education.

Objective 3.1: InSTEPP will create communication mechanisms for widespread dissemination of its knowledge-based research.

Objective 3.2: To document progress in achieving these goals InSTEPP will produce an annual report, noting the broader impacts and intellectual merit of NCSU's public policy research and engagement.

Although these goals and objectives will guide InSTEPP's initial efforts, the Institute will adapt rapidly in response to new societal needs. Other outputs of the Institute are described below in the section on Products.

3.3 InSTEPP's Primary Public Policy Focus Areas

This section provides an overview of InSTEPP's three public policy focus areas by motivating each as a priority within the state and nation.

3.3.1 Energy and the Environment

Fast-paced population growth in North Carolina presents its citizens with economic and social opportunities, but also presents important environmental and energy challenges — and NCSU is at the heart of North Carolina's response to these challenges. In 2008, the NCSU Institute for Emerging Issues led a state-wide effort to examine energy in North Carolina. The Emerging Issues Forum in February 2008 was the culmination of that effort at which Governor Mike Easley announced the creation of the Advanced Transportation Energy Center at NCSU. The Center will serve as a catalyst to attract jobs to the state, contribute to reducing the nation's dependence on imported oil and cut out emissions that contribute to poor air quality. Furthermore, using everything from switchgrass to agricultural waste, scientists across several NCSU colleges are developing ways to convert biomass into clean-burning alternative fuels in ways that will not distort markets for food crops. Another noteworthy, and multi-disciplinary, example of NCSU's ability to provide energy policy leadership relates to North Carolina's

Senate Bill 3⁷. This legislation placed North Carolina in the forefront of Southeastern states, requiring investor owned utilities for the first time to either purchase some part of their energy supplies from renewable sources, or to substitute reduced demand through increased efficiency in place of new generation. NCSU, with its established strength in power systems engineering, nuclear engineering, advanced materials and a wide range of information technologies will be a key source of the know-how and talent that will make implementation of this legislation possible. The NC State Solar Center is an exemplary institution in these regards, providing a model for the synthesis and application of useful scientific and technical information in ways that directly meet the needs of citizens and businesses across the state.

In addition to energy availability, cost-effectiveness, and its environmental impact, many other challenges face North Carolina and indeed, all rapidly growing areas of the country. Poor urban air quality, protection of coastal resources, water resource constraints, and open-space protection are just a few key environmental and resource challenges being addressed by state and local policy makers. In 1999, North Carolina passed legislation establishing the “Million Acre Plan”⁸ which had as its goal to set aside 1 million acres in NC by 2009. By 2007, approximately 500,000 acres had been preserved, and the state is not expected to be near the goal by 2009. The importance of this shortfall is only underscored by the recent estimates that the state loses more than 100,000 acres *per year* to development.⁹

In addition to lost open space, fast-paced population growth in NC further stresses the state’s limited water resources. A projected 50% increase in population over the next 25 years, combined with few prospects for substantive growth in water supplies, means that tough policy choices will need to be made. Changes in coastal resources and pressures from past development in the face of rising sea levels will also present new challenges for state leaders. NCSU is well positioned to provide leadership in policy-setting and implementation in each of these areas of environmental policy. A sample of programs and centers at NCSU that provide knowledge transfer based on unbiased research and analysis to state and national policy makers in all areas of environmental protection include the Center for Environmental and Resource Economic Policy, the Natural Resource Leadership Institute, the Water Resources Research Institute housed at NCSU, and the Watershed Education for Communities and Officials program.

In summary, all aspects of the human/energy/environment interface are addressed by NCSU programs (see Appendix B). NCSU has academic programs and internationally recognized faculty in forest and water-resource management; agricultural production and its impact on the environment; fisheries and ocean systems management; land-use policy; civil and environmental engineering; green landscape and building design; energy and the environment; and climate science and policy. Clearly, NCSU is well positioned to contribute to energy and environment-related public policy at the state, national and international levels.

⁷ Codified as S.L. [Session Laws] 2007-397), signed by the Governor on August 20, 2007.

⁸ Codified in G.S. 113A-240 and 241.

⁹ *2006 Annual Report of the N.C. Million Acre Initiative*, Presented to the Governor of North Carolina and the Environmental Review Commission of the North Carolina General Assembly, Sept. 1, 2007, by the North Carolina Department of Environment and Natural Resources, Office of Conservation and Community Affairs, available online at: http://www.onencnaturally.org/pages/progress/2007_Million_Acres_report.pdf.

3.3.2 Information-security and Bio-security

In recent years, many major reports by organizations including the National Academies¹⁰ have outlined critical problems in information security. The President's Information Technology Advisory Committee (PITAC) identified security and privacy concerns as fundamental obstacles to medical informatics deployment in their 2004 report, *Revolutionizing Health Care Through Information Technology*¹¹. As a result, research addressing both the security of electronic healthcare and the resulting policy has recently received, and will continue to receive, much attention. In 2005, the Government Accountability Office (GAO) found that the Department of Homeland Security (DHS) did not have the resources or technology to adequately defend the nation's critical IT systems¹², and that the security of government IT systems was increasingly threatened¹³. The PITAC also concluded in its 2005 report, *Cyber Security: A Crisis of Prioritization*¹⁴, that the nation suffers because of insufficient support of information security research and engineering.

Over the past decade, the volume of state and federal legislation and regulation addressing information security has increased. Federal legislation, such as The Health Insurance Portability and Accountability Act (HIPAA), The Gramm Leach Bliley Act (GLBA), The Sarbanes-Oxley Act (SOX), and The Children's Online Privacy Protection Act (COPPA) continue to present challenges to a variety of stakeholders. Similarly, state legislation is being introduced. North Carolina is one of 43 states that recently enacted a data breach notification law (N.C. Gen. Stat. § 75-65). Compliance is complex and costly, however; healthcare organizations will spend an estimated \$17.6 billion over the next few years to bring their systems and procedures into compliance with HIPAA¹⁵. Existing guidelines and standards both fail to provide specific solutions and make compliance challenging. According to an Ernst & Young survey of executives in over 1,300 international organizations, compliance with regulations and policy surpassed addressing worms and viruses as the primary driver of information security policy in 2005 and 2006¹⁶. The consequence of regulatory non-compliance is now most important to those responsible for assuring that the security of software systems dealing with sensitive information. As a result, a variety of national and local stakeholders are seeking both technical, social and policy assistance with regard to information security.

North Carolina businesses, agencies and state officials continuously seek assistance from NCSU faculty engaged in security policy research. As evidenced by funding that information security faculty have received from the National Science Foundation (NSF) and the Department of Defense (DoD) in recent years to develop methods and tools to address these information security and regulatory compliance challenges, NCSU is uniquely positioned to make public policy contributions. For example, NCSU has been a U.S. National Security Agency National Center for Academic Excellence for Information Assurance (IA) Education since 2002.

¹⁰ See <http://www.nap.edu/collections/terror/index.html> for a series of reports and publications on counter-terrorism and security.

¹¹ Report to the President: http://www.nitrd.gov/pitac/meetings/2004/20040617/20040615_hit.pdf

¹² General Accountability Office. "Information Security: Department of Homeland Security Faces Challenges in Fulfilling Statutory Requirements," Report GAO-05-567, April 2005, US Govt. Printing Office.

¹³ General Accountability Office. "Information Security: Emerging Cybersecurity Issues Threaten Federal Information Systems," Report GAO-05-231, May 2005, US Government Printing Office.

¹⁴ See Appendix C, pp. 52-54 of the PITAC (President's Information Technology Advisory Committee) report *Cyber Security: A Crisis of Prioritization* for a comprehensive bibliography.

¹⁵ *Medical Privacy - National Standards to Protect the Privacy of Personal Health Information*. Office for Civil Rights, US Department of Health and Human Services, downloaded from: <http://www.hhs.gov/ocr/hipaa/finalreg.html>, 2000.

¹⁶ Ernst & Young. "2006 Global Information Security Survey," 2006.

Moreover, in 2008, NCSU was designated a U.S. National Security Agency National Center for Academic Excellence for Information Assurance (IA) Education - Research (CAE-R). In addition, in April 2008 NCSU started a multi-year Secure Open System Initiative (SOSI) with support from federal government (via the U.S. Army Research Office), and from open source giants Red Hat and IBM. The initiative begins during a period of increasing popularity for open computer systems. SOSI researchers will find ways to protect open computer systems—used by the military, power plants, and financial centers—from hackers and other outside attacks that could harm the nation’s security and economy.

Bio-security has also emerged as a critical public policy challenge. Bio-security has expanded to include the protection of the economy, environment, and health of living things from diseases, pests, and bioterrorism. The nation and the State of North Carolina must establish research and policy efforts that will reduce illnesses or deaths — what public health professionals call “morbidity and mortality” — resulting from a natural epidemic, an industrial accident or an international attack. Federal investments in bio-security after the September 11 attacks and the subsequent anthrax attacks are reflected in increased university-based applied research¹⁷. The specter of mass casualty terrorism raised by September 11 and overseas attacks, and the limited but frightening experiences with chemical and biological terrorism over the last twenty years, have heightened the public and policy awareness of bio-security. Furthermore, concerns of bio-security now exceed those of bio-safety¹⁸.

The University’s College of Veterinary Medicine and College of Agriculture and Life Sciences are the preeminent institutions of their kind in North Carolina and in the southeastern United States. These units’ expertise and that of other NCSU faculty members are vitally important in an era of growing environmental and human-caused hazards.

Bio-security policy focuses on information and appropriate disclosure of information and knowledge to safeguard our food supplies and to protect against dangerous pathogens and toxins. This encompasses strategies to assess and manage the risks of infectious diseases, pests, invasive alien species, living modified organisms, and biological weapons¹⁹. Protecting the environment, safeguarding human, animal, and plant health, and supporting a robust economy involve diverse disciplines that can no longer afford to work within disciplinary boundaries. Human health and domestic animal health have historically been seen as separate, and both are often treated as isolated from wildlife or ecosystem health, even though recent human health concerns (e.g. HIV/AIDS, SARS, monkeypox, “Mad Cow” Disease, avian influenza) all have their sources in ecosystem problems or animal health. Recently, the Centers for Disease Control and Prevention stated that 75% of new and emerging diseases in humans — and all the major outbreaks since the early 1980s — have been of animal origin²⁰. This realization is reflected by increased interest in integrating bio-preparedness, veterinary medicine, and public health — often known as “One Medicine”²¹. Numerous groups have called for leadership in joining animal and public health and in expanding expertise in bio-security of these populations and their resources. In 2005 the

¹⁷ R.M. Atlas. Biosecurity concerns: Changing the face of academic research, *Chemical Health and Safety*, 12(3), pp. 15-23, May-June 2005.

¹⁸ Ibid.

¹⁹ Laura A. Meyerson, Jamie K. Reaser; and Christopher F. Chyba. A Unified Definition of Biosecurity (4 January 2002) *Science* 295 (5552), 44a. [DOI: 10.1126/science.295.5552.44a]

²⁰ The National Center for Zoonotic, Vector-Borne, and Enteric Diseases. Centers for Disease Control and Prevention. <www.cdc.gov/nczved/> Accessed 29May08.

²¹ One Medicine. Center for Comparative Medicine and Translational Research, NC State College of Veterinary Medicine. <www.cvm.ncsu.edu/ccmtr/onemedicine.htm> Accessed 29May08.

National Academies of Science reported in *Animal Health at the Crossroads*²² that “The workforce on the front lines of animal care is not adequately educated and trained...for animal disease prevention, detection, and diagnosis.” Recognizing and understanding how infectious agents, pests, and invasive species spread and jeopardize the health of people, animals, plants and the environment can avert major human and environmental catastrophes, such as epidemics and famine.

NCSU is also at the forefront of information security and bio-security efforts as discussed above and InSTEPP will be the vehicle for ensuring that our research reaches the broadest possible audience of adopters.

3.3.3 STEM and Workforce Education

The need for improved STEM education at all levels of our educational system, and the need for opportunities for adults employed in declining industries to be retrained for growing STEM-related industries, is widely recognized by state and federal policymakers, the business community, and educators²³. There are many factors driving this recognition, including: (1) the poor performance of U.S. students, as compared to students in other industrialized countries, in international comparisons of student achievement in mathematics and science²⁴; (2) the rapid changes in the demands of the workplace, with industrial and agricultural jobs declining as technology-related job are increasing²⁵; (3) the increased diversity of students in our schools, combined with the continued under-representation of minority and female students in many STEM related professions²⁶; (4) globalization²⁷; (5) the shortage of qualified mathematics and science teachers²⁸; (6) the critical need for a citizens to be well informed about science and technology to address the challenges facing the nation; and (7) the broader need to prepare everyone to be lifelong learners who can adapt to ongoing workplace and societal changes²⁹.

The impact of rapid technological advances influences many aspects of our society, the continued changes in the requirements for success in the workplace, the increased cultural and linguistic diversity in our population, and the increased capabilities of our global competitors, have brought the issues of STEM and workforce education back into the forefront. At the federal level, the 2007 America Competes Act funds some of the recommendations of the American

²² *Animal Health at the Crossroads: Preventing, Detecting, and Diagnosing Animal Diseases*. Committee on Assessing the Nation’s Framework for Addressing Animal Diseases; Board on Agriculture and Natural Resources; Division on Earth and Life Studies; National Research Council of the National Academies. <books.nap.edu/catalog.php?record_id=11365> Accessed 29May06.

²³ Business-Higher Education Forum. *Securing America’s Leadership in Science Technology, Engineering, & Mathematics*. Washington D.C.: BHEF, 2005. Available online: http://www.ncccs.cc.nc.us/Business_and_Industry/neit.htm. Retrieved May 30, 2008.

²⁴ National Center for Educational Statistics. *Trends in International Mathematics and Science Study, 2003*. Available online at <http://nces.ed.gov/timss/>. Retrieved June 1, 2008.

²⁵ Commission on Professionals in Science and Technology. *Policy and the STEM Workforce System*, Washington, D.C. CPST, 2007. Available online at http://www.cpst.org/STEM_Report.cfm. Retrieved May 30, 2008.

²⁶ Ibid.

²⁷ Levy, Frank & Murnane, Richard J. *The New Division of Labor: How Computers are Creating the Next Job Market*. Princeton, NJ: Princeton University Press, 2004.

²⁸ Business-Higher Education Forum. *Securing America’s Leadership in Science Technology, Engineering, & Mathematics*. Washington D.C.: BHEF, 2005. Available online: http://www.ncccs.cc.nc.us/Business_and_Industry/neit.htm. Retrieved May 30, 2008.

²⁹ Levy, Frank & Murnane, Richard J. *The New Division of Labor: How Computers are Creating the Next Job Market*. Princeton, NJ: Princeton University Press, 2004.

Competitiveness Initiative³⁰ to provide increased professional development for teachers, attract new teachers to the classroom, develop research-based curricula, and provide access to flexible resources for worker training. North Carolina is a leader in developing policies and programs to address STEM and workforce education issues at the state level. The North Carolina State Board of Education mission “is that every public school student will graduate from high school, globally competitive for work and postsecondary education and prepared for life in the 21st Century.” State policies and programs focus on developing “future-ready schools” and “future-ready students”, building upon four key recommended areas: (1) delivery of 21st century curriculum, instruction, assessments and accountability; (2) presence of technology tools in the classrooms; (3) existence of widely accessible and relevant personnel and professional development; and (4) pervasive existence of high bandwidth connectivity and scalable networks³¹.

NC has been very active in developing state policies and programs, with substantial funding, toward achieving these recommendations. These include the Connectivity Initiative, designed to bring high-bandwidth connectivity to every school in the state; the North Carolina Public Virtual School, which increases the curriculum options by provided online courses for high school students; Project IMPACT, which explore new models of technology use and professional development in K-12 schools; the 1-1 Computing Pilot program, which explores the impact of every student and teacher having a laptop computer; and the Learning Objects Repository and State Education Portal projects, designed to provide widespread access to information and online learning resources³². On the workforce development side, the NC Community College System Economic and Workforce Development Division works closely with industry to provide two types of programs: (1) New and Expanding Industry Training and (2) Customized Industry Training, which are national models of how a community college system can collaborate with industry to address workforce development needs³³. Bridging high schools and post-secondary education are the Early College High Schools, small, personalized schools in which over five years of enrollment students obtain both their high school degree and either an associate’s degree or two years of college credits³⁴. North Carolina leads the nation in the number of Early College High Schools that are already in operation.

The NC e-Learning Commission, chaired by Lt. Gov. Beverly Purdue, brings together government, business, and education leaders to develop further recommendations for advancing K-20 education in NC, with a focus on technology infrastructure for schools, community colleges, and colleges; online learning; and workforce preparation. Three of the members of this commission are from NCSU, and we play a major role in several of the initiatives listed above.

³⁰ U.S. Department of Education. American Competitiveness Initiative Web Site., n.d., <http://www.ed.gov/about/inits/ed/competitiveness/index.html>. Retrieved May 30, 2008.

³¹ North Carolina Joint Commissions. A Joint Report on Information Technology Presented to the 2008 Session of the General Assembly, January, 2008. Available online: <http://www.betanc.com/files/reports/February%2008-Info%20Tech%20Joint%20Report.pdf>. Retrieved May 30, 2008.

³² North Carolina Joint Commissions. A Joint Report on Information Technology Presented to the 2008 Session of the General Assembly, January, 2008. Available online: <http://www.betanc.com/files/reports/February%2008-Info%20Tech%20Joint%20Report.pdf>. Retrieved May 30, 2008.

³³ North Carolina Community College System: New and Expanding Industry Training Web Site. N.d. http://www.ncccs.cc.nc.us/Business_and_Industry/neit.htm. Retrieved May 30, 2008.

³⁴ North Carolina Joint Commissions. A Joint Report on Information Technology Presented to the 2008 Session of the General Assembly, January, 2008. Available online: <http://www.betanc.com/files/reports/February%2008-Info%20Tech%20Joint%20Report.pdf>. Retrieved May 30, 2008.

Following the November 2008 elections, at the federal level we will see an active debate about the reauthorization of No Child Left Behind and, at the state level, the next administration's initiatives for preparing future-ready students. At both levels, attention will focus on policies to address the critical shortage of qualified STEM teachers; policies to support updating schools to better prepared students for the lives they will lead in the 21st century; policies to better address the pressures of global competitiveness, policies to address the continued under-representation of minorities and woman in many technical fields, and policies to prepare U.S. workers from declining industries to find a place in the emerging economy. InSTEPP will provide a platform from which our scholarship and expertise can inform these important policy decisions that will influence how the next generation will be educated.

3.4 Public Policy Strengths

The Task Force on Public Policy was asked to identify the public policy strengths that NCSU can leverage to further support the UNC Tomorrow mission and the needs of the state and nation. The task force collected data about recent course offerings; sponsored projects and external engagement; research centers and institutes; policy-related Ph.D. theses; policy-related publications; and specific examples of policy-related contributions to government. We employed grounded theory³⁵ to identify our three main strength areas. We now provide a few examples of projects, centers, and engagement efforts to provide concrete evidence of NCSU's strengths in these areas.

The Task Force's data gathering and analysis revealed three major public policy strengths (energy and the environment; information security and bio-security; and STEM workforce education). Four additional areas of public policy expertise were also identified (public health and health care systems; social, economic, and behavioral aspects of aging; social welfare issues; and education policies for youth and families at risk. These topical areas co-exist with and directly relate to the School of Public and International Affairs' (SPIA) central role in public policy instruction at undergraduate and graduate levels, and its faculty members' nationally and internationally prominent research on analyzing, developing and evaluating public policy. However, despite the more than 13 existing centers and institutes that were identified as having public policy central or secondary to their missions or initiatives, NCSU lacks an institutional structure that reaches out to scholars and educators and provides a touchstone for integrating knowledge and application. Indeed, each member of the Task Force is involved in research on some aspect of public policy, but few members had professional research and teaching relationships; moreover, even members of this Task Force learned that their research interests and expertise overlapped to a considerable degree. Thus, the data revealed that NCSU's public policy strengths were dispersed across the university; many faculty members working in public policy areas were not connected with either SPIA or existing centers or institutes. The Task Force's recommendation for the establishment of InSTEPP creates an intellectual center for public policy research, information dissemination, education, and outreach that deliberately seeks to integrate this fragmented environment. Not only will the Institute facilitate and nurture relationships among NCSU faculty who share common research and application goals, it will also serve as a touchstone for state, regional, and national visibility of the university's strength in public policy.

³⁵ B.C. Glaser and A.L. Strauss. *The Discovery of Grounded Theory*. Chicago: Aldine Publishing Company, 1967.

The following subsections highlight key projects and initiatives at NCSU that can be further leveraged for broader public policy impact in the three InSTEPP's core public policy focus areas.

3.4.1 Energy and the Environment

The following tables provide specific examples, among the many identified, of existing public policy related research centers, sponsored research and courses at NCSU that support InSTEPP's focus on energy and the environment.

| Table 3.1 Existing Centers | |
|---|--|
| North Carolina Coastal Resources Law, Planning, and Policy Center | Directors: Lisa C. Schiavinato and Joseph J. Kalo North Carolina Sea Grant is a co-sponsor and co-director (with UNC-CH) in formation/operation of the NC Coastal Resources Law, Planning and Policy Center, located at UNC-Chapel Hill. The Center undertakes several coastal law/policy related studies/analyses each year, tapping UNC-Chapel Hill law school faculty and students. |
| Center for Environmental Resource Economic Policy | Director: Laura Taylor The Center for Environmental and Resource Economics Policy (CEnREP) provides leadership in economic research and outreach programs to foster forward-thinking environmental policy for North Carolina and the nation. CEnREP accomplishes these objectives by fostering interdisciplinary and policy-driven research to solve today's most pressing environmental and natural resource problems. |
| North Carolina Solar Center | Director: Steve Kalland Created in 1988, the North Carolina Solar Center serves as a clearinghouse for sustainable energy programs, information, research, technical assistance, and training for the citizens of North Carolina and beyond. Through its core programs in renewable energy, clean transportation, green building, and industrial efficiency technologies, the Center seeks to stabilize energy costs for consumers, stimulate local economies, reduce dependence on imported fuels, and mitigate the environmental impacts associated with conventional energy production. The Solar Center is sponsored by appropriations from the N.C. General Assembly as well as grants from numerous federal and state agencies, foundations, and the private sector. The Solar Center is operated by the College of Engineering at NCSU. |

| Table 3.2 Sponsored Projects | |
|---|---|
| Strategic Positioning of Biofuels in the Economic Context of Agriculture, Crude Oil, and Auto-Manufacturing | PI Name(s): Henry Tsai, Alexander Hobbs, Robert McGuffey, Duncan Holthausen, Peter Wurman, Kelly Zering, Alun Lloyd. Funding Source: U.S. Department of Energy, U.S. Department of Agriculture Amount: \$584,593 The project will develop a game theory model linking major players in the Biofuels area including agriculture, the oil industry, automakers and the U.S. government. The model will show how each of the players makes decisions and how they affect the larger, integrated and dynamic Biofuels system. The model will then be used to address technological, economic and policy questions that need to be answered to a higher degree of certainty. |

| Table 3.3 Policy Courses | |
|--|---|
| ARE 309 –Environmental Law & Economic Policy | Current federal and state environmental laws and regulations and their common law foundations. Relationship of the law and its regulatory mechanisms to economic policy issues: externalities, pollution taxes, incentives, permit trading, and cost-benefit analysis. Major environmental topics including water and wetlands, solid and hazardous wastes, pesticides, clean air, endangered species and nuisance actions. |
| ARE 436 –Environmental Economics | Usefulness of economics in understanding pollution, congestion, conservation and other environmental problems. Relevant economic tools such as pricing schemes, abatement cost curves, damage functions and benefit-cost analysis. Pollution taxes, regulations, marketable permits and subsidies considered in designing alterations in the incentive system. Current public policy alternatives in the context of non-market decision-making. |
| ECG 515 –Environmental and Resource Policy | Application of price theory and benefit-cost analysis to public decisions related to resources and environment. Emphasis on evaluation of water supply and recreation investments, water quality management alternatives, public-sector pricing, common property resources and optimum management of forest and energy resources. |

3.4.2 Information security and Bio-security

The following tables provide specific examples, among the many identified, of existing public policy related research centers, sponsored research and courses at NCSU that support InSTEPP's focus on information security and the bio-security.

| Table 3.4 Existing Centers | |
|--|--|
| Secure Open Systems Initiative (SOSI) | <p>Directors: Dennis Kekas</p> <p>The Secure Open Systems Initiative (SOSI) aims to strengthen significantly mission critical information technology infrastructures vital to the Department of Defense, state and nation and to accelerate the creation and growth of high tech industries in North Carolina and beyond by providing a centralized repository of research results, testing tools and qualification services. Partners will include Red Hat, IBM and Cisco.</p> |
| The Privacy Place | <p>Director: Annie I. Antón</p> <p>The Privacy Place is multi-university, multi-disciplinary research center established in 2001. It has become one of the premier academic online resources for people interested in privacy research. It has served as a focal point of information and collaboration for researchers, faculty, students, industry and the public. The center assists practitioners and policy makers in eliciting, expressing, and enforcing policies and regulations in the context of modern information technology (IT). These tools and methodologies help ensure that regulations and privacy policies are aligned with the software systems they govern.</p> |
| U.S. National Security Agency National Center for Academic Excellence for Information Assurance (IA) Education - Research (CAE-R). | <p>Director: Ting Yu</p> <p>NCSU has recently been designated as the National Center for Academic Excellence for Information Assurance (IA) Education - Research (CAE-R). This center will coordinate the campus wide educational and research activities on information assurance technologies.</p> |

| Table 3.5 Sponsored Projects | |
|---|---|
| Collaborative Research: Transparency and Legal Compliance in Software Systems | <p>PIs: Annie I. Antón (NCSU, Engineering: Computer Science), Eugene H. Spafford (Purdue Univ.), David Baumer (Management: Bus. Mgmt.), Ignacio Valdes, M.D. (YourDoctorProgram.Com)</p> <p>Funding Source: National Science Foundation – Science of Design</p> <p>Amount: \$ 500,000 (NCSU: \$ 270,407)</p> <p>This project takes a holistic view of the design of transparent and legally compliant software systems. Key research questions that we will address include: (a) How should system requirements be specified so they may be realized in design and implementation to ensure legal and regulatory compliance? and (b) Given that software designs need to satisfy multiple stakeholders' (organizations, law/policy makers, government agencies, public citizens, etc.) contradictory, inconsistent and difficult to understand objectives, how can the design process of these systems be improved to lead to convergence and satisfaction of these requirements in a transparent and auditable fashion?</p> |
| Collaborative Research: A Comprehensive Policy-Driven Framework for Online Privacy Protection: Integrating IT, Human, Legal and Economic Perspectives | <p>PIs: Annie I. Antón and Ting Yu (NCSU, Engineering: CSC); David Baumer and Michael Rappa (NCSU, Management: Bus Mgmt); Elisa Bertino, Ninghui Li, Melissa J. Dark, Victor Raskin and Robert W. Proctor (Purdue University)</p> <p>Funding Source: National Science Foundation – Cyber Trust</p> <p>Amount: \$ 1,194,000 (NCSU: \$ 534,000)</p> <p>This project seeks to provide a comprehensive framework for protecting online privacy, covering the entire privacy policy life cycle. This cycle includes enterprise policy creation, enforcement, analysis and auditing, as well as end user agent presentation and privacy policy processing. The project integrates privacy-relevant human, legal and economic perspectives in the proposed framework.</p> |

| Table 3.6 Policy Courses | |
|--|--|
| BUS 511, Information Security and Privacy for Managers | Covers the challenges of and approaches to handling sensitive data, including policy & legal issues facing consumers & businesses from both a U.S. and international perspective. Privacy considerations and ethical issues associated with information management are also included. |
| CSC 591 – Privacy Technology, Policy & Law | Examines the interaction between privacy technologies, public policy & regulations that govern the surveillance, collection and use of sensitive personal information; and examines the complexities introduced by new and emerging technologies governed by law and public policy. |
| FS 540 – Food Safety and Public Health | Issues and developments related to the relationship between food safety and public health, including emerging foodborne pathogens; virulence and pathogenicity; foodborne toxins; epidemiological techniques used in the investigation of foodborne disease; rapid detection methods; and quantitative microbial risk assessment in food safety. |
| FS 553 – Food Laws and Regulations | Federal and state laws and regulations and case law history affecting food production, processing, packaging, marketing and distribution of food and food products. History of food law, enactment of laws and regulations, legal research, and regulatory agencies. |
| PP 460 Critical Issues in Plant Protection | This course is of particular interest to students minoring in plant biosecurity and regulatory science; however, it is open to all students. The course will feature subject-matter experts in the area of regulatory plant science that will deliver one-hour lectures on emerging and critical topics in regulatory plant protection. |
| VPH 554 – Trade and Agricultural Health | This course is designed for agriculture and food safety specialists, veterinarians, and epidemiologists interested in learning about international trade and agricultural health, including production, food security, public health, tourism and the environment. |

3.4.3 STEM and Workforce Education

The following tables provide specific examples, among the many identified, of existing public policy-related research centers, sponsored research and courses at NCSU that support InSTEPP's focus on STEM (Science, Technology, Engineering and Mathematics) education.

| Table 3.7 Existing Centers | |
|--|---|
| Friday Institute for Educational Innovation | <p>Directors: Glenn M. Kleiman</p> <p>The mission of the Friday Institute for Educational Innovation is <i>to advance education through innovation in teaching, learning, and leadership</i>. The institute conducts research, creates resources, advocates to improve teaching and learning, and provides services to educators and policymakers. Its work focuses on innovations that will help prepare all students, from preschool through college, to live and work successfully in the 21st century.</p> |
| ENVISIONS: Educational Network Venture into Science/Math Instruction, Outreach, and North Carolina Standards (Science House) | <p>Director: Dr. Sharon Schulze</p> <p>The Science House annually reaches over 3,000 teachers and over 20,000 students from six offices spread across the state. Its mission is to increase student enthusiasm for science by partnering with K-12 teachers to promote hands-on inquiry-based science learning. Our student science enrichment activities, teacher training programs, and curriculum-related programs link the research university to the needs of K-12 science and mathematics education. Science House hands-on learning activities include Science on the Road school demonstrations, laboratory technology workshops for teachers, long-term loans of laboratory equipment, summer student research programs, and development of learning materials.</p> |

| Table 3.8 Sponsored Projects | |
|------------------------------|---|
| STEM Education Certificate | <p>PIs: Duane Akroyd; Carol Kasworm</p> <p>Funding Source: National Science Foundation</p> <p>Amount: \$990,000</p> <p>The departments of Adult and Community College Education (ACCE) and Mathematics, Science and Technology Education (MSTE) within the College of Education were awarded a grant to develop a prototype on line graduate certificate in Community College Teaching for faculty who teach in STEM related areas. The grant has created a model for new access, understandings, and faculty enhancement related to professional development of STEM faculty in community colleges.</p> |

| | |
|---|--|
| <p>Markers of STEM Success (MOSS): An Eleven-Year Longitudinal Study of High Achieving Young Women's Interests, Experiences, and Preparation for STEM Careers</p> | <p>PIs: Sarah Berenson (Math & Science), Joan Michael (Psychology), Mladen Vouk (Computer Science) Roger Woodard (Statistics), and Sue Bracken (Adult & Higher Education).</p> <p>Funding Source: National Science Foundation</p> <p>Amount: \$511,000</p> <p>Over the past seven years, we have collected data on 250 high achieving young women, ages 11-20 for an intervention project and an ITWF project. High achieving is defined as those girls selected/electing to take Algebra 1 in middle grades, putting them on track to take calculus in high school. The proposed research provides an opportunity to extend and redirect the current database for a new study of STEM career choice. By 2009 we expect to have 100 longitudinal records to inform post-undergraduate analysis, 200 longitudinal records to inform the undergraduate analysis, and 300 longitudinal records to inform the high school analysis.</p> <p>The research questions related to the STEM Career Choice Model are:</p> <ul style="list-style-type: none"> • How do interests in STEM careers affect high achieving young women's experiences and educational preparation over time? • How do experiences, over time, affect high achieving young women's interests and educational preparation? • How does the educational preparation of high achieving young women, over time, affect their interests and experiences? • What are the critical events within high achieving young women's experience, interest, and education that affect STEM career decisions? <p>Coupled with the identification of critical events, this study will provide greater insight into women's STEM career choices.</p> |
|---|--|

| Table 3.9 Policy Courses | |
|--|--|
| ELP 735: Policy Research in Education | This course draws on both classic and contemporary materials in educational policy research and primarily focuses on the substance of policy research rather than methodology. |
| ELP 736: Qualitative Research In Education and Policy Analysis | This course provides public school personnel and educational policy analysts with research training and experience to address educational research and policy problems using qualitative methods |

3.5 Public Policy Engagement

By focusing on energy and the environment, information security and bio-security, and STEM workforce education, InSTEPP seeks to address public policy challenges that are especially replete with ethical, legal, economic and societal concerns. The influence of InSTEPP's scholarly and outreach work are expected to be far reaching as its focus areas (energy and the environment; information-security and bio-security; and STEM workforce education) affect many spheres of society—we thus expect our results to enhance scientific and technological understanding among the public as well as policy makers and decision makers. Research teams formed under the auspices of InSTEPP will be comprised of faculty as well as graduate and undergraduate students across the university, engaged in inter-disciplinary projects. Current examples of successful collaborative public policy projects appear in Section 3.2 above. We now provide a few illustrative examples of NCSU's engagement with policy makers and the government representatives.

The North Carolina Sea Grant College Program, an inter-institutional program based at NCSU, is actively engaged in providing policy-related contributions to government. For example, in 2006-2007, the Executive Director was the chair of North Carolina's Waterfront Access Study Committee and staffed by North Carolina Sea Grant and the North Carolina Coastal Resources Law, Planning and Policy Center. The committee was created by the North Carolina General Assembly and charged to study the degree of loss and potential loss of the

diversity of uses along the coastal shoreline of North Carolina, and how these losses impact access to the coastal public trust waters of the state³⁶.

Through a Cooperative Agreement, NCSU and the National Oceanic and Atmospheric Administration (NOAA) established a program called Climate and Weather Impacts on Society and the Environment (CWISE), led by Dr. Len Pietrafesa, which is in its fifth year. CWISE has supported 18 students and six post doctoral fellows who have worked on 24 projects to date that have societal value and applications such as: highly accurate numerical model output of coastal surge and inundation caused by storms; the original climate/weather model code of hurricane frequency of occurrence and landfall predictions; coupled precipitation and inland and coastal flooding scenarios and best evacuation routes; the relationships between increased human development of natural areas and increased storm damage and societal costs therein; increased coastal erosion with rising sea level; environmental data analytics; etc. CWISE has introduced students to the challenges and value of creating new societal tools that offer unprecedented insights into building a sustainable society. This seminal program has resulted in a planned Cooperative Institute (CI) on Climate Analytics and Applications between NCSU, NOAA and other federal agencies and laboratories and universities in North Carolina, South Carolina, Alabama, Arkansas and Florida. This CI will be the national model for analyzing climate records and providing broad public and industry information and products and services. Some of the knowledge that has been brokered through CWISE has been shared with NC congressional representatives and state officials and is being utilized to inform public policy makers. For example, the sea level rise results will influence state government decisions on bills presently before the NC Legislature. Research into the climatology of coastal wind fields will help guide local government and state lawmakers on possible restrictions and common rules regarding the capturing of coastal wind power. The planned CI is expected to greatly expand these types of efforts into such public policy arenas as surface and air transportation, highway and building construction codes, and so on.

NCSU faculty members are actively engaged in providing policy-related contributions in information security to government. For example, in September 2006, Computer Science Professor Annie I. Antón was appointed to the U.S. Department of Homeland Security Data Privacy and Integrity Advisory Committee by Secretary Michael Chertoff. The committee advises Secretary Chertoff and the DHS Chief Privacy Officer on “programmatic, policy, operational, administrative and technological issues relevant to DHS that affect individual privacy, data integrity and data interoperability and other privacy-related issues.”³⁷ In June 2007, Antón testified before the House Ways and Means Social Security Subcommittee on Protecting the Privacy of the Social Security Number from Identity Theft on behalf of the Association of Computing Machinery U.S. Public Policy Committee³⁸.

NCSU is well represented in current policy considerations about STEM and workforce education in North Carolina. Phil Emer and Glenn Kleiman from the Friday Institute, and Tom Miller, Vice Provost for Distance Education and Learning Technology, serve on the NC e-Learning Commission; the Commission is chaired by Lt. Gov. Beverly Purdue and is developing policy and program recommendations to be considered by the State Board of Education and the Legislature. Kleiman is co-chair of the Curriculum and Instruction subcommittee, which is

³⁶ <http://www.ncseagrant.org/index.cfm?fuseaction=page&filename=waterfronts.html>

³⁷ http://www.dhs.gov/xinfo/share/committees/editorial_0512.shtm

³⁸ <http://waysandmeans.house.gov/media/pdf/110/Anton.pdf>

currently developing recommendations for state policy and programs for professional development of teachers and faculty, K-20. Emer directs the Connectivity Project, an outcome of the work of the e-Learning Commission that is linking all schools to a broadband network, and both Emer and Kleiman serve on the steering committee for the 1-1 Computing Pilot Program. The Friday Institute and the College of Education are conducting evaluations of the major NCSU initiatives involving technology in education, with each evaluation designed to inform future policy decisions. Kleiman and Emer are also working with the Consortium for School Networking and other national organizations in developing policy proposals to be submitted to the next federal administration. Many other NCSU faculty members are involved in other aspects of STEM and workforce education policies at the state and national levels.

Under the leadership of NCSU College of Textile Dean A. Blanton Godfrey, faculty members have worked with the North Carolina Department of Commerce on economic development policy and support for several years. In addition, Dr. Godfrey serves on the North Carolina Institute of Medicine that recommends policy to the Governor as well as the North Carolina Board of Science and Technology — the Governor’s science policy board.

Finally, NCSU faculty members have an excellent track record of mentoring and actively engaging underrepresented and minority students in research projects and outreach experiences. Similarly, InSTEPP will impact education for both undergraduate and graduate students as well as continuing education for professionals and security, energy and environmental awareness education for citizens—through its education and outreach plan—that capitalizes on many initiatives that are already on-going. Participation by industry sponsors and advisors, as well as workshops that include academics, policy makers and business representatives, will enhance the opportunity for academic/industry partnerships.

3.6 Products

InSTEPP will need appropriate products that can be externally evaluated if it is to reach its goals. For example, a variety of products will be required to ensure that InSTEPP reaches both a wide audience and a targeted audience that can best benefit from dissemination of InSTEPP’s work. Multiple products will help InSTEPP reach its goal of serving the state legislature, media, industry, and the public. Products will take the form of an annual report; aggressive efforts to obtain external funding for InSTEPP’s research and clearinghouse functions; national significant “grand challenge” competitions that offer the winner a “prize” (e.g. a grant), which can be announced at the annual conference; degree programs and curricula (with a focus on the needs of practitioners) for both undergraduate and graduate students; an annual conference or workshop targeted to external stakeholders in conjunction with the grand challenge conference; faculty and graduate student training on effective connections and communications with public policy makers and the media; a public policy internship program targeting students who do not often consider policy work, such as those in science and engineering; policy briefs, working/white papers, and an engaging, cutting edge web-site; legislative information days; monthly brown bags with speakers from government or business who have expertise in public policy; an internal speaker series in year one of InSTEPP’s inception; and a distinguished lecture series that will gain national exposure for NCSU and its faculty members’ work.

3.8 Existing Centers and Potential Partnerships

There are many university centers relevant to the InSTEPP mission as shown in Table 3.11. Table 3.12 lists additional potential partners and funding agencies. These resources provide a substantial substrate upon which to build the InSTEPP and with which there should be substantial synergy.

3.9 Potential Funding Sources

3.9.1 External agencies that fund public policy work

Examples of NSF agencies with active or recurrent requests for grant proposals that include public policy.

| Table 3.11 Existing & Potentially Synergistic Centers at North Carolina State University | |
|--|---|
| Center Name | Web site |
| Energy and the Environment | |
| William R. Kenan Institute for Engineering, Technology & Science at NC State University | http://www.ncsu.edu/kenan/ |
| North Carolina Coastal Resources Law, Planning, and Policy Center | http://www.nccoastallaw.org |
| Center for Environmental and Resource Economic Policy | http://www.ncsu.edu/cenrep/ |
| North Carolina Sea Grant College Program | http://www.ncseagrant.org |
| North Carolina Solar Center | http://www.ncsc.ncsu.edu/ |
| The Water Resources Research Institute of The University of North Carolina | http://www.ncsu.edu/wrri/ |
| NCSU Institute for Emerging Issues | http://www.ncsu.edu/iei/ |
| Center for Urban Affairs & Community Services | http://www.mckimmon.ncsu.edu/cuacs.html |
| Center for Universal Design | http://www.design.ncsu.edu/cud/ |
| Center for Marine Science and Technology | http://www.cmast.ncsu.edu/ |
| Institute for Transportation Research and Education | http://itre.ncsu.edu |
| Information Security & Bio-Security | |
| U.S. National Security Agency National Center for Academic Excellence for Information Assurance (IA) Education - Research (CAE-R). | http://www.cae-r.ncsu.edu/ |
| The Privacy Place | http://www.theprivacyplace.org |
| CyberDefense Laboratory | http://cdl.csc.ncsu.edu/ |
| Infosec@NCSU | http://ecommerce.ncsu.edu/infosec/ |
| Food Animal Residue Avoidance Databank (FARAD) | http://www.farad.org/ |
| Secure Open Source Initiative | http://www.sosi.ncsu.edu/ |
| STEM Workforce Education | |
| Friday Institute for Educational Innovation | http://fi.ncsu.edu/ |
| Institute for Nonprofits | http://www.chass.ncsu.edu/nonprofit/ |

- Division of Social and Economic Sciences, Decision, Risk and Management Sciences (DRMS)
- Division of Graduate Education, Graduate Research Fellowship Program (GRFP)
- Division of Undergraduate Education, NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)
- NSF-wide, Cyberinfrastructure Training, Education, Advancement, and Mentoring for Our 21st Century Workforce (CI-TEAM)
- Division of Computer and Network Systems, Global Environment for Networking Innovations (GENI)
- Division of Atmospheric Sciences, Solar, Heliospheric, and INterplanetary Environment (SHINE)

- Education and Human Resources (EHR): (1) Alliance for Broadening Participation in STEM (ABP); (2) Communicating Research to Public Audiences; (3) Ethics Education in Science and Engineering (EASE); and (4) Math and Science Partnership (MSP)
- The NSF’s Human and Social Dynamics (HSD) competition. While HSD ended in 2008, it is highly likely that a similar multidisciplinary program will emerge to continue this program’s success.

Examples of NIH agencies with active or recurrent requests for grant proposals that include public policy

- Behavioral and Social Science Research on Understanding and Reducing Health Disparities

Examples of U.S. Department of Education agencies with active or recurrent requests for grant proposals that include public policy:

- Institute for Education Sciences (1) Evaluation of State and Local Education Programs and Policies Competition and (2) Education Policy, Finance and Systems Research Competition

| Table 3.12 Potential Partners and Funding Agencies | |
|---|--|
| Center Name | Web site |
| UNC System Applied Public Policy Center | No URL available. |
| UNC School of Law and other UNC campuses | http://www.law.unc.edu/ |
| Campbell University School of Law | http://www.law.campbell.edu/ |
| Duke University School of Law | http://www.law.duke.edu/ |
| Universities across the nation in collaborative projects | Various |
| Federal Research and Scientific Agencies | |
| National Science Foundation (NSF) | http://www.nsf.gov |
| National Institutes of Health | http://www.nih.gov |
| National Aeronautics and Space Administration (NASA) | http://www.nasa.gov |
| U.S. Department of Energy (DOE) | http://www.doe.gov |
| Department of Defense (DOD), including the Defense Advanced Research Projects Agency (DARPA) | http://www.defenselink.mil http://www.darpa.gov |
| Intelligence Advanced Research Projects Activity (IARPA) (Part of the office of the Director of National Intelligence, housed at the University of Maryland). | http://www.iarpa.gov |
| Department of Homeland Security (DHS), including the Federal Emergency Management Agency (FEMA) | http://www.dhs.gov http://www.fema.gov |
| United States Environmental Protection Agency | http://www.epa.gov |
| Centers for Disease Control | http://www.cdc.gov |
| Local government, including the NC Association of County Commissioners (NCACC) and the NC League of Municipalities | http://www.ncacc.org/ http://www.nclm.org/ |
| Industry | |

3.9.1 Examples of currently funded public policy research

Examples of currently funded public policy research at NCSU are provided in the tables at that appear in Section 3.2 of this report.

4. Assessment and Evaluation

Measurement for accountability will be a key objective for the InSTEPP. To this end, we will begin by measuring the short- and medium-term outputs, including:

- External funding;
- External review by advisory boards;

- Students (Undergraduate and Graduate) in courses related to the Institute;
- Placement of graduates in public policy related jobs, internships or advanced degree programs;
- Papers, publications, theses and dissertations;
- Collaborations;
- Attendance at InSTEPP conferences, brown bags, training and other outreach activities;
- Technical and policy assistance provided to policy makers;
- Number of faculty members serving on public policy advisory boards;
- Number of times the website is accessed and the number of times InSTEPP's products are viewed, downloaded or cited;
- Number of Partnerships; and
- BibTex / EndNote Index of InSTEPP publications.

After several years, the Institute will be able to assess its actual influence on public policy through various policy analytic methods, including case studies and oral histories of decisions in which InSTEPP products have been useful or influential.

5. Management Plan and Implementation Procedures

InSTEPP is uniquely positioned to provide public policy assistance to policy makers in the state and nation. Its executive director and research directors will be responsive to state and national public priorities for which NCSU can offer domain-specific expertise. InSTEPP's administrative structure will be organized to effectively further its goals; the Task Force proposes the following management and resource infrastructure.

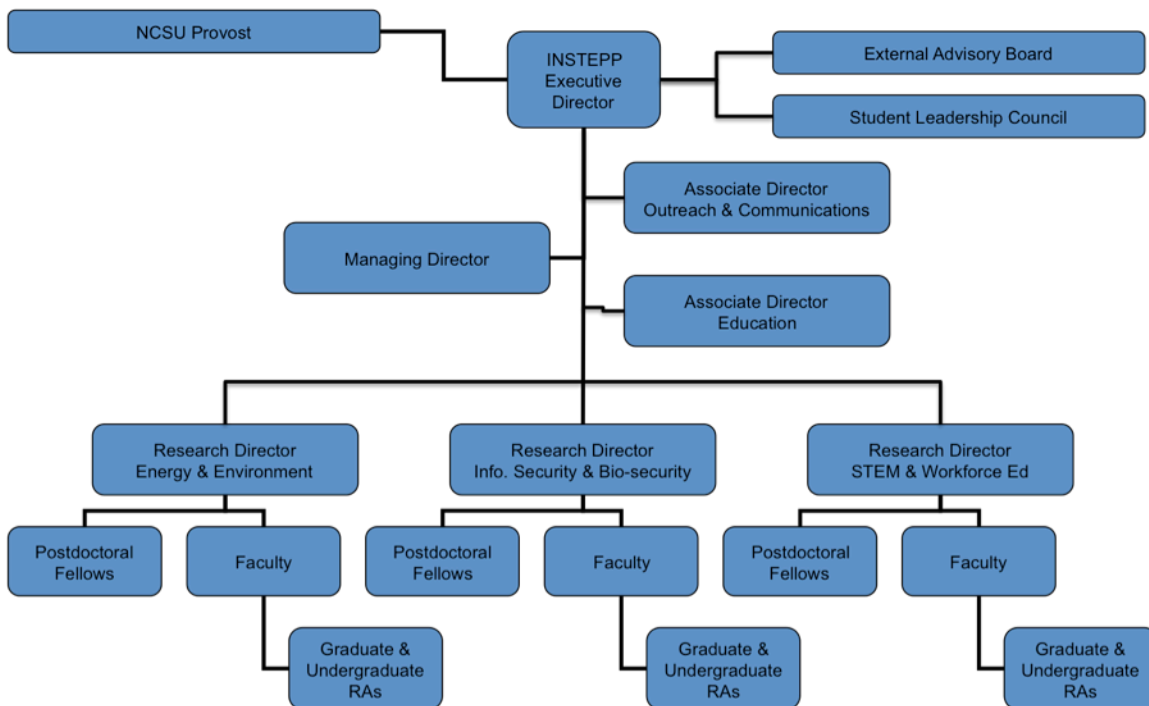
5.1 Organizational Structure and Management System

The organizational and management structure for InSTEPP is portrayed in Figure 1. We now discuss the key roles that comprise the management and staffing for the institute.

Executive Director. The Institute will be led by an executive director who is an expert in public policy, preferably in one of InSTEPP's three focus areas (energy and the environment; information security and bio-security; and STEM workforce education). This individual will have experience in administering substantial research projects, directing centers and laboratories, and chairing and organizing professional conferences. In the first year, there will be an interim director drawn from NCSU faculty with expertise in public policy. A national search will be conducted for the executive director during InSTEPP's first year of operation.

Research Directors. Each of the three focus areas (energy and the environment; information security and bio-security; and STEM workforce education) will have a research director. These research directors will be distinguished senior faculty with recognized public policy expertise in their focus area with a proven record of excellence in research. Research directors will be granted half-time appointments to fulfill their duties as InSTEPP research directors. Research director appointments will be indefinite. Each research director is responsible for understanding the research capabilities of InSTEPP faculty and staff, tracking past and current InSTEPP associated research, and seeking new research opportunities inside and outside the university for all InSTEPP-affiliated personnel. Research directors will work with the executive director to plan research strategy for the institute, and to present research and research plans to others.

Figure 1: InSTEPP Organizational Structure



Managing Director. The managing director is someone with managerial and technical experience, but not a member of the academic faculty. This is a continuing, senior position that reports to the Executive Director. This individual is responsible for the day-to-day management of InSTEPP affairs, including crafting policies for center resources, supervising staff, managing resources, tracking budgets, and serving as the administrative contact for university needs. The Managing Director works closely with the Executive Director in strategic planning, event planning, university outreach and other activities. The Managing Director has full-designated signature authority from the Executive Director for all business-related InSTEPP issues.

Associate Director for Education. Because InSTEPP’s mission is to serve the state and nation, it is critical to appoint an individual to direct our education efforts to the general public and K-12 students, as well as colleges and universities throughout the state and region. This individual will report to the Executive Director and translate research results in educational materials; for example, by translating research into applied public policy modules for NCSU’s Science House or by working as a liaison to K-12 educators in North Carolina.

Associate Director for Outreach and Communications. This individual will report the Executive Director; the position will be filled by a non-faculty member with experience in marketing, public relations, or related areas. This individual will be responsible for seeking out new funding opportunities for InSTEPP, with a focus on new sponsors for initiatives such as the Grand Challenges contest, the InSTEPP annual conference, the distinguished lecture series, etc. In addition, the director for outreach and public relations will help with strategic planning and event planning.

Post-Doctoral Fellows. InSTEPP will fund at least one post-doctoral fellow in each of the three focus areas (energy and the environment; information security and bio-security; and STEM workforce education). These post-doctoral fellows will be appointed as NCSU InSTEPP Fellows.

Graduate and Undergraduate Research Assistants. External funding will be sought to fund graduate and undergraduate research assistants to support InSTEPP research projects.

Staffing. InSTEPP's faculty members will offer multidisciplinary expertise to objectively analyze public policy challenges to promote knowledge-based public policy. In addition to providing incentives to existing NCSU faculty in the way of interdisciplinary grants and course buyouts, NCSU seeks to hire nine new faculty members – three in each of the three focus areas (energy and the environment; information security and bio-security; and STEM workforce education). These junior faculty members will have tenure-track appointments in InSTEPP with graduate faculty status in specific academic departments to ensure these assistant professors can advise graduate students and direct graduate theses.

The Task Force members agree that NCSU should commit to creating an atmosphere and environment that will enable junior faculty members' interdisciplinary public policy research programs to flourish. Other universities with centers offer joint appointments to junior faculty but these provide inadequate support for success as a result of conflicting and entrenched promotion criteria that often stifle true interdisciplinary work. The Task Force strongly recommends that InSTEPP be established at NCSU as an interdisciplinary institute that serves as the home department for its new faculty hires. This strategic approach will position the institute and its interdisciplinary faculty hires for success, as well as creating a bold, new paradigm for interdisciplinary research institutes worldwide.

One obvious concern about faculty with joint appointments is how to fairly evaluate them for promotion and tenure. It is particularly challenging for junior faculty with joint appointments to demonstrate suitability for tenure in multiple departments: this has been noted at other universities, such as in the report by the UC San Diego (UCSD) Senate Administration Task Force on Multidisciplinary Joint Appointments³⁹. For example, it may be difficult for engineering faculty to evaluate tenure for an environmental engineer who mostly applies her work in public policy venues. Similarly, public policy faculty would find it difficult to evaluate an environmental engineering faculty member because their criteria for scholarship and impact are so different from what is customary in engineering. This stands in contrast with our recommendation: that junior faculty members have InSTEPP as their "home department." This would allow a more direct and meaningful evaluation by academic peers in the same department, thus resulting in a more consistent and fair process.

As evidenced by this report, many NCSU faculty members are actively engaged in public policy. As an incentive to existing NCSU senior faculty members who are funding significant public policy projects in InSTEPP's primary focus areas, NCSU will grant joint appointments as appropriate. For example, an environmental engineering professor would be granted a joint (or courtesy) appointment in public policy.

³⁹ *Multidisciplinary Research and Education at UC San Diego: Best Practices and Guidelines for Multidisciplinary Appointments*, Report by the Senate-Administration Task Force on Multidisciplinary Joint Appointments, retrieved from: <http://academicaffairs.ucsd.edu/offices/apo/reports/MJATFReport.pdf>, April 2007.

Our goal is to build diverse leadership, faculty, and student teams to achieve InSTEPP's mission and objectives, and to proactively address the public policy challenges facing society at large. We will achieve this by increasing the awareness, preparation, and pathways into the profession for students from underrepresented groups. We will directly address this with the active cooperation of our own faculty, students, and partners. The challenges posed by InSTEPP's goals require comprehensive expertise in both technical and non-technical areas. The field is best served by having a well-educated, diverse set of experts with different viewpoints and cultural perspectives, as befits the nature of the institute's mission.

Executive Committee. This committee will include the director, research directors, associate director for education and outreach as well as the chair of the external advisory board, and chair of the student leadership council. In addition, one rotating senior faculty from one of the three focus areas (energy and the environment; information security and bio-security; and STEM workforce education) – will come from departments or centers related to the core areas will also serve on this executive committee. This group will convene in person or electronically at least every other month to review progress on research tasks, plan future directions for the institute, oversee the budget, and oversee and initiate various outreach and educational efforts.

Student Leadership Council. Graduate and undergraduate students in each of InSTEPP's core focus areas (energy and the environment; information security and bio-security; and STEM workforce education) will serve on the SLC for a renewable one-year term. This group will meet in person quarterly and report to the Executive Committee on issues that concern them, and in response to questions by that group, the Institute Director, or the advisory board as appropriate.

External Advisory Board. The external advisory board meets at least once a year to provide high-level management and situational advice to the InSTEPP management team. The external advisory board members will be appointed to three-year terms and will be chosen based on their science, technology, engineering, education and public policy backgrounds. The board will have balanced representation with individuals possessing distinguished experience in industry, government and/or academia; expertise in energy, the environment, information security and bio-security, and STEM education. This board will provide review functions to ensure that InSTEPP is achieving its objectives on yearly basis. Members of the advisory board will be un-biased.

5.2 Headquarters

The NCSU Public Policy Task Force recommends that, administratively, InSTEPP directly report to the Provost's office with SPIA as a key facilitator and partner. As for InSTEPP's physical location, NCSU is undergoing unprecedented facilities expansion. In 2007, NCSU's centennial campus was named the top research park of the year by the Association of University Research Parks (AURP). Centennial campus is located on a 1,334-acre site that is adjacent to NCSU's main campus; it houses more than 130 companies, government agencies as well as NCSU research and academic units. InSTEPP will be housed on NCSU's Centennial campus to leverage existing partnerships with industry and government. Therefore, the task force recommends that the InSTEPP be housed in the new James B. Hunt Jr. Library to leverage these existing partnerships and further foster the interdisciplinary nature of the InSTEPP.

5.3 Required Resources

Current funding is a blend of state funds, grants and contracts of approximately \$3 million per year. The annual cost of InSTEPP, if fully funded, is expected to be approximately \$5.5 million,

with start-up funding of \$250,000 for a director and core support staff (internal funds), and \$1.25 million for additional faculty positions in the core areas.

Startup funding would be necessary for the usual office space and furnishings, as well as information technology (computers, peripherals, internet access). The Institute’s greatest asset will be collaboration space: workspace for project teams that could work much like small business incubators, in that the work space and resources would provide the initial support for large projects to get off the ground. Furthermore, an AV-equipped conference room that would hold about 30 people—similar to that available at the Renaissance Computing Institute or the NCSU Institute for Transportation Research and Education (ITRE)—would provide meeting space for brown bags, research presentations, and other project oriented activities. We assume that InSTEPP would be able to gain access to large theatre-style space at NCSU for distinguished lecturers and other large public events. Startup funds would also be needed for a new director, IT and other support staff, and faculty positions.

5.4 Financial Support

The cost projection for InSTEPP is \$3 million per year. Additional funding to support research and outreach activities as well as students and post-docs will be sought from external grants and contracts.

5.5 Implementation Procedures and Timeline

The NCSU Public Policy Task Force was appointed January 4, 2008 to create a strategic direction and action plan by June 2008. Table 3.10 proposes an implementation timeline for the planning and official launch of the InSTEPP. The five-year timeline assumes active involvement on the part of faculty across campus departments and institutes/centers. Elements of the management structure, such as the External Advisory Board, will be formalized by the permanent director in collaboration with InSTEPP’s executive committee. Key performance indicators will be developed by the permanent leadership team for evaluation and reporting.

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|--|------|------|------|------|------|
| Circulate / Discuss NCSU 2008 Public Policy Task Force Final Report | █ | | | | |
| Identify Interim InSTEPP Director (Fall 2008) | █ | | | | |
| Request Funding From State of NC (2008 – 09) | █ | █ | | | |
| NCSU Public Policy Brown Bags (Fall 2008) | █ | █ | █ | █ | █ |
| Conduct National Search & Hire Permanent Executive Director (Fall 2008) | █ | | | | |
| Conduct National Search & Hire 3 Focus Area Research Directors (Spring 2009) | | █ | █ | | |
| Appoint External Advisory Board Members (Spring 2009) | | █ | █ | | |
| Strategic Planning Retreat for InSTEPP Executive Committee (Summers) | | █ | █ | █ | █ |
| InSTEPP Grand Challenge Contest and Conference | | | █ | █ | █ |